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CONTENTS

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THOSE charged with the cure of economic disorders are certain to meet with factors not unknown to the veterinary profession. Lack of coöperation, political expediency, ignorance of fundamentals, personal greed and organization rivalry will combine to attempt disparagement and defeat of trained thinkers to the end that low wage-scales, unbalanced production and cut-throat competition will continue to exert their baneful effects on economic health.

IN the final test the attitude of buyers will be an important factor in determining the type and mode of industrial life developed in this era.

JOURNAL
of the
American Veterinary Medical Association
Formerly AMERICAN VETERINARY REVIEW
(Original Official Organ U. S. Vet. Med. Assn.)
H. Preston Hoskins, Secretary-Editor, 221 N. LaSalle St., Chicago, Ill.

Vol. LXXXIII, N. S. Vol. 37 **NOVEMBER, 1933** **No. 5**

MAKING HISTORY IN VETERINARY EDUCATION

History is being made in the field of veterinary education in the United States. The period which began about 1925 probably will be referred to as one of the most important in veterinary education in this country. It was in 1925 that the number of veterinary students started upward for the first time since the World War. The last of the private veterinary colleges in the United States closed its doors in 1927. It was in 1928 that we were able to record an upward trend in the number of graduates after having reached a low of 118 the year before. At about this time the A. V. M. A. Committee on Education began a survey of the situation and a comprehensive report was made by the Committee at the Kansas City meeting in 1931. The same year, Iowa State College adopted the requirement of a year of college work for all matriculants in veterinary medicine. The same step was taken by three other institutions (Colorado, Cornell and Kansas) in 1932. This year Ohio State University joined the list. As matters now stand, we have five colleges in the United States maintaining the equivalent of a five-year course in veterinary medicine, with five still on the old four-year basis.

The A. V. M. A. Committee on Education has been authorized to proceed with the proposal to classify our veterinary colleges. In this respect our profession has been backward, as compared

with others. Medical colleges have been graded and classified for quite a while. There is no valid excuse for us to continue our *laissez faire* attitude in this matter. There is no genuine comfort in believing that all of our veterinary colleges are on the same plane of excellence. To be frank, they are not. We are merely fooling ourselves if we think they are. The custom that has been in vogue for almost twenty years, of publishing annually a list of colleges recognized by the A. V. M. A., has a strong taint of obsolescence. As a matter of fact, there have been no unrecognized colleges in existence in this country since 1927.

There are those who think that we have too many veterinary colleges, even though the number at present is less than at any other time in over forty years. If one prominent veterinarian could have his way, he would reduce the number of colleges to about six and increase proportionately the numerical strength of the faculties of these remaining institutions. Most of our veterinary colleges are undermanned at present. Several barely meet the minimum requirements specified for the teaching staff, to secure recognition by the A. V. M. A. Except in three or four colleges there is no "second string" of teachers. Heads of departments are loaded down with classes to a point where they have no time for research or other means of self-improvement. Other branches of the profession are more remunerative than subordinate teaching positions, as a result of which we see very few understudies for our veterinary professors. The average young American graduate in veterinary medicine simply does not relish the idea of waiting even ten, not to mention twenty or more years, to step into a dead man's shoes. He can do better elsewhere.

Instead of our veterinary educators worrying about the number of students needed to supply the demand for veterinarians, something that is highly debatable right now, and rather likely to be regulated by the law of supply and demand, it would appear to be more in order to build up the teaching staffs of these institutions. After all, men really make an institution of learning, much more than stately buildings, elaborately illustrated catalogs and swollen student enrollments.

12th International Veterinary Congress
New York—August 13-18, 1934

VETERINARY STUDENT ENROLLMENT FOR 1933-34

Considerable interest continues to be shown in the number of students enrolled in our veterinary colleges if we may judge from the number of inquiries received from various sources. In addition to those veterinarians who are connected with our educational institutions, members of the profession engaged in practice and commercial work, particularly, have shown a keen interest in the veterinary student situation. Quite a few inquiries are received from young men who are considering the advisability of studying veterinary medicine, and many of them want to know how many veterinary students there are at the present time.

At first glance it would appear that there is an increase in the number of veterinary students enrolled this year, if merely the total figure for this year is compared with the total figure for last year. Such a comparison, however, does not reflect the true situation that has existed during the past two years, or since the time that our veterinary colleges inaugurated the so-called five-year course. If we include in our total enrollment figures those students who are taking the pre-veterinary year, we naturally will get a higher number than if our total includes only those students whom we are in the habit of referring to as freshmen, sophomores, juniors and seniors. In this connection, as was pointed out one year ago, Cornell University does not include pre-veterinary students in reporting on veterinary students enrolled each year. If we count only those veterinary students who are freshmen, sophomores, juniors and seniors, we find that the total number this year is only 1,370, as compared with 1,401 a year ago, and 1,378 two years ago. From this it will be seen that the number of veterinary students in our colleges has remained comparatively stationary for three years.

The figures for this year show a total of 1,550 students enrolled in our veterinary colleges. This number includes 33 graduate students, who really should not be considered in the same light as undergraduate students. There are 147 special students, the majority of these being enrolled for the pre-veterinary year (Colorado, Iowa, Ohio). Kansas State College, as explained in this connection one year ago, does not designate new matriculants in the veterinary course as pre-veterinary students but as first-year veterinary students.

The accompanying table shows a fairly even distribution of students among the four classes. There are 331 freshmen, 338 sophomores, 387 juniors and 314 seniors. In this connection, it

is interesting to point out that these are the largest junior and senior classes that we have had for the past decade or longer, whereas, on the other hand, the freshman and sophomore classes are considerably smaller than the same classes last year or the year before. As a matter of fact, the freshman class this year is the smallest in five years. This condition undoubtedly is attributable directly to the adoption of the longer veterinary course.

In reporting their figures this year some of the deans made interesting comments: Dean Glover reports that Colorado Agricultural College now has practically all the veterinary students that can be accommodated with the present buildings, classrooms, equipment and faculty. Dean Giltner, of Michigan State College, intimates that there will be no five-year course at East Lansing for the time being, as there does not appear to be too many veterinary students there at this time.

Dean Hagan advises that the New York State Veterinary College has petitioned the trustees of Cornell University to be allowed to limit the number of freshmen entering next year to 30 students. The veterinary faculty at Ithaca feels that 30 is the maximum number that can be taught satisfactorily. It is especially in connection with the teaching of clinical subjects that it is believed advisable to limit the number of students to the facilities available. Furthermore, according to Dean Hagan, there is no indication that New York is undersupplied with veterinarians at the present time.

Commenting on the situation at Pennsylvania, Dean Dick directs attention to the fact that 55 freshmen were allowed to matriculate this year—five more than the limit set about a year ago. This was the direct result of the unusual economic situation which has prevailed during recent years and which caused quite a number of veterinary students to drop out of college and others to postpone starting the course. More than 100 applied for admission to the freshman class this fall and in order to be sure of obtaining the quota of 50 students, 55 were allowed to matriculate. Of these, more than 30 per cent have had some college work and four have bachelor degrees.

In commenting on the addition of the pre-veterinary year at Ohio State University, Dean Brumley points out that it has been very gratifying to find such a representative group of 48 young men who are willing to spend five years in obtaining a veterinary education. The figure given by Dean Brumley represents the number of pre-veterinary students enrolled at Ohio State Uni-

versity this year. Examination of the accompanying table shows that there are more veterinary students enrolled at Ohio than at any of the other veterinary colleges, and in this connection Dean Brumley points out that the number of veterinary students enrolled at his institution really is larger than it should be with the present faculty and teaching plant.

The University of Pennsylvania opened its doors this year to women students in the Veterinary School. One young lady took advantage of this opportunity. There are two women students at Michigan, two at Washington and two at Ohio. There were three enrolled at Columbus last year but one was unable to return this year on account of illness.

Veterinary student enrollment for the college year 1933-1934.

	Fr.	Soph.	Jun.	Sen.	Spec.	Grd.	Tot.	1932–33	Chg.
Alabama Poly. Inst.	21	29	25	19	0	0	94	72	+22
Colorado Agr. Coll.	18	14	42	16	21*	1	112	118	− 6
Cornell Univ.	35	30	56	44	2	8	175	181	− 6
Georgia State. Coll.	C	L	0	S	E	D		43	−43
Iowa State Coll.	35	28	14	59	31*	4	171	175	− 4
Kansas State. Coll.	27	17	53	46	31†	4	178	167	+11
Michigan Sta. Coll.	15	23	27	15	0	7	87	87	0
Montreal, Univ. of.	7	7	10	12	0	0	36	48	−12
Ohio State Univ.	20	68	53	33	48*	8	230	212	+18
Ontario Vet. Coll.	37	49	38	26	0	1	151	139	+12
Penna., Univ. of.	55	40	29	27	14	0	165	148	+17
Texas A. & M. Coll.	28	14	16	3	0	0	61	35	+26
Washington, S. C. of.	33	19	24	14	0	0	90	82	+ 8
Totals (1933–34).	331	338	387	314	147	33	1550	1507	+43
Last year.	383	391	353	274	68	38	1507	1418‡	

*Pre-veterinary students.
†Includes 29 pre-veterinary students.
‡Total number of students for 1931-32.

CODES

At the Chicago convention the Association approved the appointment of a special committee on NRA matters. This committee was instructed to see to it that the Association was represented at hearings on any codes that involved the veterinary profession. At least two such hearings have been held in Washington and the A. V. M. A. has had a representative present on each occasion.

During the week of August 20, a hearing was held on the code submitted by the manufacturers of anti-hog cholera serum and

virus. The A. V. M. A. sent Dr. C. C. Hastings, of Williamsville, Ill., to Washington to safeguard the interests of the veterinary profession to the best of his ability. It is estimated that veterinarians administer approximately 70 per cent of the serum used in the United States. There could be no better reason for having the profession represented at the hearing.

On October 2, a hearing was held in Washington on the code submitted by the baby chick hatchery industry. It might be asked, "In what way did this code affect veterinarians?" Well, here is the connection. The code, among many other things, used a large number of terms that had to be defined. Among these were a number that included the word "accredited." For some time there have been two groups in the poultry industry, one seeking a rather broad usage for the term "accredited," and the other favoring the restriction of the use of the word to matters having to do with health and disease, *e. g.*, "B. W. D.-Accredited," "Tuberculosis-Accredited," etc. At the 1931 meeting of the United States Live Stock Sanitary Association, a resolution* was adopted favoring the restriction of the word "accredited" to terms used for defining the health of flocks.

Dr. H. M. Martin, of Philadelphia, represented the A. V. M. A. at the hearing on the code for the baby chick hatchery industry.

IN NEW QUARTERS

When the proposal to move the A. V. M. A. headquarters from Detroit to Chicago was being studied, it developed that there was considerable difference of opinion as to the particular part of Chicago that was best adapted for the office of the organization. Rather than yield to the opinion of any one person or persons, it was decided to move the office to Chicago, rent temporary quarters for a year or so, and allow the Secretary-Editor to study the situation at close range. This plan has been carried out.

Shortly after our removal to the Windy City, it became apparent that the location on West Washington Boulevard was not the right one. It was inconvenient for those attached to the office as well as for those who wished to call at the office on various missions. It soon developed that we were too far away from the center of activities in Chicago and too much time was necessary in going back and forth between the office and other places where it was necessary for us to transact business almost daily. We

*Report of the Committee on Resolutions: Jour. A. V. M. A., lxxx (1932), n. s. 33 (3), p. 517.

were not getting the callers we wanted to see, and were getting too many that we did not want to see.

This situation was laid before the Executive Board and removal to a more central location was authorized. To make a long story short, we are now comfortably located in the La Salle-Wacker Building, at the corner of La Salle Street and Wacker Drive, one block from Chicago's famous loop. The headquarters are located on the eighteenth floor, in space that was never occupied before. The suite was laid out for us, according to our own specifications, and it is believed that it would be difficult to find a more efficiently arranged layout, for an office of its size, in any part of Chicago. The suite consists of the Secretary-Editor's private office, general office for the staff, library, work-room and store-room. A five-year lease has been negotiated.

Our new address is 221 North La Salle Street. The new telephone number is RANdolph 0569.

EXECUTIVE BOARD ELECTION

A special election is being held in Executive Board District 5, to fill the vacancy created by the election of Dr. C. P. Fitch to the presidency of the A. V. M. A. at Chicago. As announced in the October issue of the JOURNAL, Dr. R. L. West, of Waseca, Minn., is temporarily filling the vacancy. Ballots calling for nominations have been sent to all paid-up members in District 5 (Iowa and Minnesota) and the polls will remain open until November 12. Then, just as soon as the nominating ballots can be canvassed and the five nominees determined, election ballots will be placed in the mail. If you are located in either Iowa or Minnesota, and have not indicated your choice for Executive Board member from your district, do so at once. Remember—November 12 is the last day for voting.

APPLICATIONS FOR MEMBERSHIP

(See July, 1933, JOURNAL)

FIRST LISTING

APT, SAMUEL 221 S. Cecil St., Philadelphia, Pa.
V. M. D., University of Pennsylvania, 1932
Vouchers: John D. Beck and A. Henry Craige.

BROWN, VICTOR R. Ontario Veterinary College, Guelph, Ont., Can.
B. V. Sc., Ontario Veterinary College, 1931
Vouchers: R. A. McIntosh and C. D. McGilvray.

HAMPTON, WILLARD — Buffalo, Wyo.
D. V. S., Kansas City Veterinary College, 1909
Vouchers: H. D. Port and W. A. Sullivan.

ROYER, HARRY K. — Stevens, Pa.
V. M. D., University of Pennsylvania, 1933
Vouchers: A. J. Allott and M. A. Emmerson.

Applications Pending

SECOND LISTING

(See October, 1933, JOURNAL)

Cameron, Hugh S., 515 Dryden Rd., Ithaca, N. Y.
Duncan, William G., Kiowa, Colo.
Groppe, Carl W., Stamm's Lane, Wheeling, W. Va.
McKenzie, K. J., 528 Division St., Northfield, Minn.
Rasmussen, W. E., 148 S. 1st St. E., Provo, Utah.

The amount which should accompany an application filed this month is $5.83, which covers membership fee and dues to January 1, 1934, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

Northwestern Illinois Veterinary Medical Association. Hotel Freeport, Freeport, Ill. November 1, 1933. Dr. Roy E. Kluck, Secretary, 220 W. Spring St., Freeport, Ill.

San Diego-Imperial Veterinary Medical Association. San Diego, Calif. November 1, 1933. Dr. L. K. Knighton, Secretary, 3438 Mountain View, San Diego, Calif.

Central New York Veterinary Medical Association. Onondaga Hotel, Syracuse, N. Y. November 2, 1933. Dr. W. B. Switzer, Secretary, R. 5, Oswego, N. Y.

New Hampshire Veterinary Medical Association. Concord, N. H. November 3, 1933. Dr. F. S. Gray, Secretary, 8 Rogers St., Plymouth, N. H.

New England Veterinary Medical Association. Hotel Bradford, Boston, Mass. November 6-7, 1933. Dr. H. W. Jakeman, Secretary, 44 Bromfield St., Boston, Mass.

Hudson Valley Veterinary Medical Society. Poughkeepsie, N. Y. November 8, 1933. Dr. J. G. Wills, Secretary, Box 751, Albany, N. Y.

Southeastern Michigan Veterinary Medical Association. Detroit, Mich. November 8, 1933. Dr. A. S. Schlingman, Secretary, Parke, Davis & Co., Detroit, Mich.

Tulsa County Veterinary Association. Tulsa, Okla. November 9, 1933. Dr. J. M. Higgins, Secretary, 3305 E. 11th St., Tulsa, Okla.

Interstate Veterinary Medical Association. Elks Building, Omaha, Neb. November 13, 1933. Dr. G. L. Taylor, Secretary, Plattsmouth, Neb.

Chicago Veterinary Medical Society. Hotel La Salle, Chicago, Ill. November 14, 1933. Dr. O. Norling-Christensen, Secretary, 1904 W. North Ave., Chicago, Ill.

Southeast Kansas Veterinary Medical Society. Neodesha, Kan. November 14, 1933. Dr. L. F. Barthelme, Secretary, Parsons, Kan.

Purdue University, Veterinary Short Course. Purdue University, LaFayette, Ind. November 14-16, 1933. Dr. R. A. Craig, Department of Veterinary Science, Purdue University, LaFayette, Ind.

Southern California Veterinary Medical Association. Chamber of Commerce Building, Los Angeles, Calif. November 15, 1933. Dr. T. G. Beard, Secretary, 3684 Beverly Blvd., Los Angeles, Calif.

Kansas City Veterinary Association. Baltimore Hotel, Kansas City, Mo. November 21, 1933. Dr. J. D. Ray, Secretary, 1103 E. 47th St., Kansas City, Mo.

Keystone Veterinary Medical Association, Philadelphia, Pa. November 22, 1933. Dr. C. S. Rockwell, Secretary, 5225 Spruce St., Philadelphia, Pa.

Southern States Veterinary Medical Association. Atlanta, Ga. November 23-24, 1933. Dr. M. R. Blackstock, Secretary, 157 W. Hampton Ave., Spartanburg, S. C.

United States Live Stock Sanitary Association. Hotel La Salle, Chicago, Ill. December 6-8, 1933. Dr. O. E. Dyson, Secretary, 45 Live Stock Exchange, Wichita, Kan.

Nebraska State Veterinary Medical Association. Hotel Lincoln, Lincoln, Neb. December 12-13, 1933. Dr. E. C. Jones, Secretary, c/o Platte Valley Serum Co., Grand Island, Neb.

South Dakota Veterinary Medical Association. Hotel Cataract, Sioux Falls, S. Dak. December 14-15, 1933. Dr. Geo. E. Melody, Secretary, Hoven, S. Dak.

American Association for the Advancement of Science. Boston, Mass. December 27, 1933-January 2, 1934. Dr. Henry B. Ward, Secretary, Smithsonian Institution Bldg., Washington, D. C.

Twelfth International Veterinary Congress. New York, N. Y. August 13-18, 1934. Dr. H. Preston Hoskins, General Secretary, 221 N. La Salle St., Chicago, Ill.

WHAT ABOUT VETERINARY EDUCATION?*

By C. H. STANGE, *Ames, Iowa*
Iowa State College

A study of the developments in veterinary medicine since 1900 is a very revealing and instructive occupation if one is interested in the future of his profession. Moreover, it is difficult to avoid the conclusion that there should be some guiding influence if the future of veterinary medicine is to avoid some of the errors of the past. It is the author's intent to refer to some significant facts out of the past which should receive consideration in developing future plans rather than try at this time to outline detailed requirements.

In order to make the best possible use of these facts we should decide, as far as possible, one of the most fundamental questions and one that should not be left to chance, *viz.*, what is to be the future field of veterinary medicine and the coming status of the veterinarian? During the past quarter of a century we have observed a great change in the character of the service rendered by the veterinary profession. Many of our problems today are of state, national, and even international character, whereas formerly we were concerned quite largely with individuals. Future changes will depend on several factors among which are: the character of training given to veterinary students, the number of veterinarians graduated into the profession, scientific discoveries, and economic conditions.

In some countries veterinary medicine is much more inclusive than it is in the United States. Should we in this country expand our conception of veterinary medicine and include much of what is not now included primarily in our field, as for example —animal breeding and nutrition, diseases of fish, game and honey bees? To what extent should the veterinary profession enter into public health work? These and other questions are pertinent in this connection because if veterinarians are to be interested in these additional lines of service, their interest must be aroused and the fundamentals at least must be given them while they are students.

The influence of training on the future interest of the veterinarian is well illustrated by the difficulties in getting some members of our profession, who were educated primarily in diseases of the horse, to interest themselves in diseases of cattle

*Presented at the seventieth annual meeting of the American Veterinary Medical Association, Chicago, Ill., August 14-18, 1933.

and swine. Those who received some education in cattle and swine diseases, generally speaking, could not be interested in poultry diseases unless they had some training along this line as students. The lack of interest in food hygiene in many sections is undoubtedly due very largely to the fact that the veterinarians as students received little or no instruction in this subject.

Danger of an Insufficient Number of Veterinarians

It may be somewhat difficult, on first thought, to appreciate how the number of veterinarians graduated into the profession could influence the future scope of the service rendered but it is easier to understand that if the veterinary profession suffers numerically our field will be invaded by charlatans and non-professional men of various kinds as well as by members of allied professions which may be crowded. If our profession is well filled not only will such invasion be difficult but veterinarians will fill the positions properly coming in the field of veterinary service. It may be observed in a number of lines of work, many of them of an institutional or governmental nature, where non-professional men or members of other professions are holding positions which could be more efficiently served by men with a veterinary training. No doubt this is partially due to the fact that such fields have not seemed sufficiently attractive to graduates in veterinary medicine but in many cases the principal reason has been that the colleges did not offer work which adequately prepared young men for such service. As long as our profession is not crowded there will be no urge for young men with veterinary training to permeate into all the fields which veterinary medicine could best serve. On the contrary, veterinarians will pick the fruit which looks best and is most easily obtained and leave the rest to others who may help themselves.

As to the scientific discoveries and their influence on the field of veterinary medicine I need to refer to only one example to impress this upon your minds. When one contemplates the effect of the discovery of the cause of hog cholera and the resultant immunizing process, we can appreciate the significance of a single discovery as far as veterinary service is concerned.

The import of economic conditions is so fresh in our minds that it requires more than brief mention. During economic depressions, members of any profession naturally gravitate into those lines of work which are least affected. During recent years, small-animal practice apparently has not suffered to the same extent as have some other branches and, as a consequence, an undue

proportion of veterinarians have become small-animal practitioners. In other lines of practice the owner attempted to help himself to a much greater degree and in many cases did not have the money to pay a veterinarian even if he employed one. It is obvious that we cannot consider a period covering but a few years in outlining plans for the future. During periods of depression, there are too many of everybody and too much of everything. During our most prosperous times, the reverse is true. During depressions, veterinarians complain about the profession being crowded and, during prosperous times, they complain about the invasion of the field of veterinary medicine by others. We may expect both of these complaints, depending on the economic conditions prevailing. It seems to the writer that a survey of the future demands and opportunities for veterinarians and the extent of the field of veterinary service would be a very fruitful work for this Association to undertake.

Responsibility of the Veterinary Colleges

The future of the veterinary profession, both qualitatively and quantitatively, is in the hands of the veterinary colleges. It is but reasonable therefore that this Association, which represents the entire profession of this country, should be vitally and actively interested in what the veterinary colleges are doing now and propose to do in the future. Because of the significance of and interest in both the number and qualification of the men being graduated, these questions are given special consideration in this paper.

No doubt we can all agree that we should have enough men in the profession to render all the service which properly comes under the scope of veterinary medicine. The difficulty lies in deciding how many men this would require, as it is so largely dependent upon undetermined factors already enumerated. Only a very wise man or a fool would venture to predict what conditions will prevail five years hence, which is the time now required after graduation from high school until completion of the course in most of our leading veterinary colleges. The best we can do therefore is to study our own developments during the past twenty years and use this as a basis to guide us in the future.

In making these studies I have used official figures supplied by the U. S. Bureau of the Census and there has been no differentiation of graduates and non-graduates. This may be objected to by some but what the writer has been attempting to get at was the question of veterinary service in its entirety. If a non-graduate re-

tires, although we may ridicule the service he has been rendering, it nevertheless provides an opening for another veterinarian.

In the census of 1900 we had in the United States 8,149 veterinarians and fourteen veterinary colleges. In ten years we had a gain of 3,503 (43 per cent) in the number of veterinarians, making a total of 11,652. The number of veterinary colleges increased nearly 29 per cent, or to eighteen. During this period the number of graduates from the schools in the United States increased from 131 to 592 per year, with an average of 347.7 per year. If the graduates from the Canadian colleges are included, we would have an increase from 191 graduates in 1900 to 613 in ten years, or a total production over this period of 4,521.

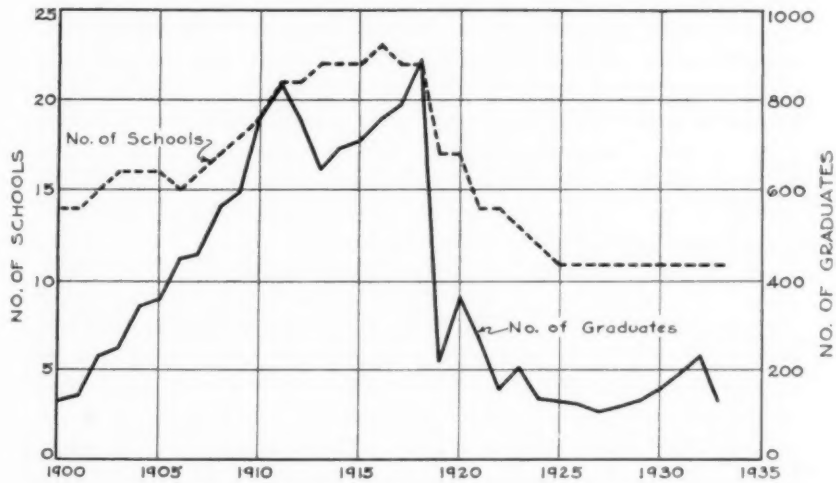

FIG 1. Graph showing that the maximum number of schools and graduates was reached from 1908-1918. During this period, 7,979 veterinarians were graduated. This produced the condition shown in the graph in figure 2.

During the next decade, we reached our maximum in number as to colleges, students, graduates and number of veterinarians in the United States. During this time we gained an additional 15 per cent, giving us a total of 13,466. The number of veterinary colleges increased to 23 but by the end of this period seven had closed. During the ten-year period, 1910-1920, the twenty-three colleges produced 7,037 veterinarians, or an average of 703 graduates per year. If we include Canada again, we have a total of 7,895, with an average of 789.5 per year.

Summarizing this twenty-year period beginning with 1900 we

find that we graduated in the United States, 10,529 veterinarians from twenty-seven veterinary colleges, and including Canada, 12,416 veterinarians from thirty colleges. Of the 10,529 veterinarians graduated in the United States, only 2,629 or (approximately 25 per cent) were graduated from colleges now in existence. From 1910 to 1918 inclusive we averaged 757 graduates per year.

Shrinkage in Number of Colleges and Graduates

Now let us examine what happened subsequent to 1920. The number of veterinary colleges in the United States has been reduced from 23 in 1916 to 10 at present. Last year we had 1,214 regular classified students in our veterinary colleges, as compared with 2,992 during the college year 1915-16. During the last census period, we graduated an average of approximately 191 veterinarians, as compared with the 703 of the previous decade. At the time of taking the last census, we registered a loss since 1920 almost as great as the gain we made during the preceding ten-year period. There was a loss of 1,614 (12 per cent). By applying life-insurance and other reliable statistics we can project the numerical condition of our profession into the future if we accept our present enrollment as fairly stationary.

At the present time we have approximately 10,760 persons under 70 years of age reported as veterinarians. By graduating 240 men per year, which is four more than we graduated this year, our profession numerically would eventually reach a level 40 per cent below the 1920 figure. This study has revealed that we have approximately 2,000 fewer veterinarians under 65 years of age now than we had in 1920. There are almost the same number of veterinarians over 65 years of age as there are under 40 years (18-19 per cent). If we separate the most active 40 years of the average man's life (20-60) into two equal periods of 20 years each, we find that 65 per cent, or nearly two-thirds, of the veterinarians between 20 and 60 years are in the upper group, while only 35 per cent fall in the lower 20-year period. This is not surprising when we remember that it has been fifteen years since a large class in veterinary medicine was graduated and that the first classes graduating during the heavy production period have been out of college for 25 years or more.

If we make a distribution in order to enable us to compare the 1920 and 1930 census figures, we find that of the veterinarians from 25 to 65 years of age in 1920, 43 per cent were from 45 to 65 years of age, while in 1930 the proportion had changed to 55 per cent.

The writer has attempted to present a picture of the numerical and age condition of our profession at the present time together with reasons why this picture appears as it does. He realizes its inadequacy but trusts that a study of the graphs may be helpful.

Overproduction leads to a demoralizing and altogether undesirable condition in any profession. It leads to decreased opportunities in the profession and thereby makes it less attractive to the ambitious and more desirable type of young men. It leads to a lowering of ethical standards and the employment of professional men in the trades and common labor classes. We have only to observe the conditions in some of the other professions to note the serious results from such a condition. At the present time

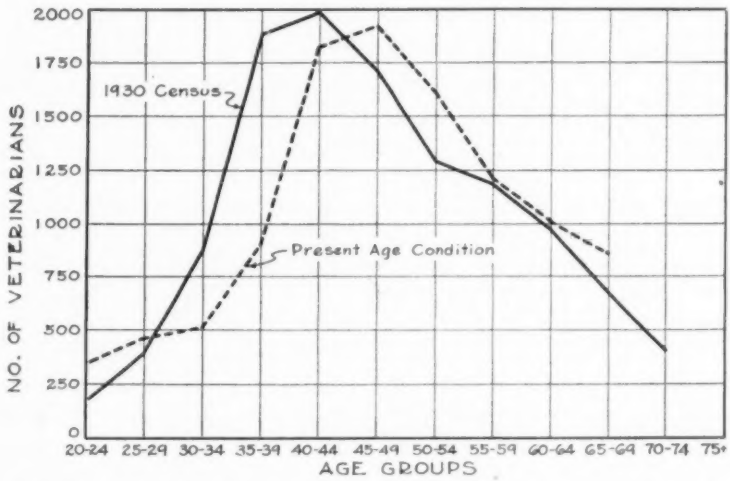

FIG. 2. Graph showing age groups. There are at present approximately 5,345 veterinarians from 40 to 55 years of age. The next 20 years will bring difficult educational problems. Five years is required to prepare a veterinarian.

there are very few, if any, graduates from recognized veterinary colleges who are driving taxicabs, attending filling stations or doing any one of a number of other kinds of work not considered even in a remote way as professional. The writer doubts if any of the other professions have a better record in this respect than ours.

A careful study of the alumni of two of our older and well established veterinary colleges revealed the fact that approximately 96 per cent of the graduates in veterinary medicine followed their profession. This reveals, on the whole, general satis-

faction with their chosen profession. It also gives us a basis for estimating the number of graduates necessary to maintain the profession. With this in mind and considering the natural death-rate, we need to graduate between 340 and 350 men per year to maintain an active profession of 12,000. This is below our 1920 census figure, which gave us 12,342 under 65 years of age.

Unless the number of graduates from the veterinary colleges increases approximately 47 per cent above this year's class we will not have a profession which will be capable of rendering the necessary veterinary service this country needs. Any increase or decrease in the scope of our service would of course affect this figure.

Public Lack of Comprehension of Veterinary Matters

When we come to consider the character or quality of the men whom we should graduate, we face a more difficult and intangible problem. We gain nothing as a profession by being particular who enters our front door and then leaving the back door wide open. Since all of our present veterinary colleges are a part of a university or state college, it should be one of our principal objectives to create a better comprehension of the field and objectives of veterinary medicine. In this connection perhaps the irritating and resentful word "ignorance" should not be used because it creates a resistance to reason which counteracts any efforts at correction. The fact cannot be denied, however, that in the field of education, and to a large extent outside, from the average man to the university and state executives, there is a lack of comprehension of veterinary matters that ranges from public misconception to unjust administrative decisions along with dangerous legislative enactments, much of which is due to pedagogic sophistry. Inadequate education in veterinary medicine is no better, if provided in the name of the state, than under any other label. Hydrargyri chloridum corrosivum is just as poisonous as corrosive sublimate.

If this Association has the courage to establish reasonable minimum requirements, it can do much for the future veterinary profession. The difficulty will probably lie in agreeing on what are reasonable requirements. Practically every veterinary college has two sets of requirements, *viz.*, those for entrance and those for graduation. The entrance requirements now vary from graduation from high school to one year of successful college or university work. Many of the courses which have been introduced into the high schools of the country are of the manual arts

variety and do not provide the mental discipline necessary to enable a young man to pursue a curriculum dealing with the medical sciences. Permit me to illustrate. The subject of immunology is so complex and, if carefully studied, contains more material of essential value in disease control than did the entire course in veterinary medicine, with the possible exception of anatomy, when many of my listeners were students.

Better Prepared Students Necessary

I will not prolong this discussion by citing other examples but it must be obvious that the students must come to us better prepared and spend more time after they arrive if they are to master the medical sciences. If the plan of some of the universities and colleges to confer the B. S. degree based on four years of high school and two years of college or university work is generally adopted, it is not impossible that the B. S. degree should be required for entrance to veterinary colleges. As yet we are not aware of the motives back of this movement and we must be careful not to get caught in the jig-saw puzzles of some of our modern educators.

The requirements for graduation are probably more important than those for entrance, yet on the whole they have received much less consideration. They should include a desirable character and personality as well as an accumulation of technical ideas and ability to pass written examinations. As long as we have colleges primarily interested in quantity with little or no emphasis on quality, there can be little progress. This Association could be of material assistance in shifting the emphasis to the proper place.

Even when provided with good entrance material it is difficult enough, with the limited financial support which even the best colleges have today, to accomplish our aims in an educational way. The writer believes that the most essential thing to be accomplished in a veterinary college is the teaching of the fundamental medical sciences. If these are not mastered in college, they certainly will not be studied after graduation. Colleges are often criticized for not producing a finished product, or in other words, not being practical. To put it in another way we are accused of neglecting the art of the practice of veterinary medicine but we must remember that the science of veterinary medicine, if it comes at all, must come before the art. The more we train our students in the art of the practice of veterinary medicine and neglect the science, the closer we approach the empirics of old,

many of whom certainly understood the art of practicing veterinary medicine.

The writer suggests, and this is not an original idea, that as a future requirement for graduation an internship with some successful practitioner be considered. For this we must have practitioners who have been keeping abreast of the scientific developments in veterinary medicine as well as cultivating the art. A practitioner who scoffs at every idea in his professional work which is new to him would not prove a desirable tutor. We can afford to ignore those "practical" zealots who look upon the application of the modern scientific developments in the practice of our profession as ignoble and unworthy. They remind one of the outdoors man who boasts about his ability to "rough it," whereas the use of a few conveniences civilization has provided would have changed the outing from a miserable nightmare to a very pleasant experience. It is utter nonsense to refuse to apply the aids and conveniences science has provided to our everyday problems. Much of the progress which has been made during the past few years in the treatment of parasites, especially in small animals, has been made possible largely through the more general use of the greatest aid to the naked eye, the microscope. This one illustration will suffice to illustrate the point under discussion.

Let us so administer our requirements that the well known poem, when paraphrased as follows, will not apply to our profession:

Some were graduated for great things,
And some were graduated for small,
And of some, it is not recorded
Why they were graduated at all.

In closing, I wish to acknowledge the grateful assistance of Dr. J. P. Foster in supplying some of the data with reference to veterinary colleges and the number of graduates.

Dog Insurance

The Canine Insurance Association, Ltd., of London, England, in a full-page advertisement in the *Veterinary Record*, for September 16, 1933, emphasizes that it offers the only insurance obtainable for non-pedigreed dogs. The coöperation and enquiries of members of the veterinary profession are invited, in the campaign of the Association for the insurance of dogs, pedigreed and otherwise.

THE INSPECTION SERVICE OF THE VETERINARY CORPS, U. S. A.*

By Major EDWARD M. CURLEY, *V. C., U. S. Army*
Fort Bliss, Texas

Veterans were employed by the War Department first to treat sick and injured animals. Other activities were merely a side line, but the War Department gradually has recognized the necessity of utilizing the services of the Veterinary Corps as inspectors to the extent that today this work is becoming of major importance, not only from the standpoint of the health of animals and men but also from a financial standpoint to the government. Contract veterinarians always were utilized on animal purchasing boards and their advice was sought on phases of animal management and horseshoeing. Recognition of the many activities in which the services of the trained veterinarian could be utilized brought about the employment of (four) veterinarians by the Quartermaster Corps whose exclusive duties were as meat and meat-food inspectors. From this time until June, 1916, when the Veterinary Corps was organized, we find many veterinarians detailed almost exclusively on inspection activities, until today as much importance is placed on this phase of our service as the actual treatment of sick and injured animals.

All government inspection agencies of whatever nature are based on soundness of the article and contract specification requirements.

It is a platitude that only well-fed armies are effective armies, which, of course, is the basic reason behind all the elaborate but effective means thrown around the individual soldier and animal to keep them effective at all times.

The federal government has encouraged and to a very great extent has put into practice the grading of articles purchased for its use by requiring inspectors to apply their knowledge to exact interpretation of specifications. The classifying and grading of perishable supplies has reached a high point of efficiency.

Many of the inspection activities now handled by the Veterinary Corps are no doubt non-professional from a purely veterinary standpoint. However, a close study will at least raise a serious doubt if any other group of officers could render such an inspection service without raising the question of authority, knowledge

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and experience in handling of the supplies under inspection. Officers of the Veterinary Corps are educated, trained and receive special instruction covering the following inspection activities, the knowledge of which is essential to preserve the health of the animals and men of the command.

1. Animal Purchase.
2. Animal Management.
3. Horseshoeing.
4. Forage Inspection.
5. Meat Food Products Inspection.
6. Dairy Inspection.

Animal Purchase

From the time that the veterinary profession was capable of rendering expert advice on the soundness of animals purchased by the military service, veterinarians have constituted an important part of all animal purchasing boards, to pass on the physical condition, age and soundness of the animal. This has been a professional activity of the first magnitude from the time of the Spanish-American War to and including the World War. This may be called the first inspection duty assigned to the Veterinary profession by the Military Authorities. With the changing of Army organization by motorization and mechanization, this first inspection service, while retaining its importance, is restricted on account of the few animals that now are being purchased.

To eliminate as much of the individual equation as possible and to insure the acquisition of animals of a suitable type, the War Department has designated that an animal purchasing board shall consist of two officers:

(1) One officer representing the purchasing branch, who is particularly concerned with suitability.

(2) One veterinary officer to pass on the age and soundness of the animal.

This is a professional activity which can not be delegated to an officer of any other branch. The Veterinary Corps officer is the officer of the Army qualified to render this advice.

Animal Management

The organization and development of a recognized Veterinary Corps on a truly professional basis was followed immediately by the Army recognizing the fact that, as professionally trained men, veterinarians were the logical persons to advise with about Army animal management. This duty is recognized because it is so closely related to maintaining the health of the animals. It

considers all phases of an animal's existence: his conditioning, stabling, feeding, watering, grooming and equipment. As all of these elements taken collectively are the very existence of the animal, it can be considered as a sanitary science, that is, the application of means and methods to keep the animal well and effective at all times, in contradistinction to the science of medicine proper, which is of a curative nature. In other words we are faced with an interlacing problem of cause and effect. The exact cause of the majority of our non-effective animals in the service is or probably could be laid to deficient or faulty animal management. No group of officers in the service is more concerned with this phase of animal life than the Veterinary Corps, nor more ready to admit of the pitfalls directly laid to mismanagement. To me this phase of our inspection activities is a professional activity of the first magnitude.

Horseshoeing

While it is said that an Army travels on its belly, it can also be recognized that animals are no better than their feet. The responsibility for maintaining properly shod animals in the service is the duty of an organization commander but it is becoming more and more the duty of the Veterinary Corps not only to be inspectors of horseshoeing but also to become the expert adviser on all matters pertaining to horseshoeing to the extent of conducting the horseshoeing school for all branches of the Army. Truly speaking the person who masters the art of horseshoeing is an artist and nowhere is such an expression borne out as a truism than in the service. Schools for horseshoers are conducted annually for selected enlisted men under the direct supervision of a Veterinary Corps officer throughout the Army.

Forage Inspection

The veterinary service with animals is primarily concerned with maintaining health and efficiency, so as to keep to a minimum the non-effectiveness of animals and also to provide necessary veterinary treatment for the sick and disabled.

Inspection of forage can therefore be logically assigned to the veterinary service from a standpoint of soundness and, at the same time, inspection for quality or compliance with class and grade.

Meat-Food Products Inspection

An inspection of these products for the Army by the veterinary profession has been maintained since the Spanish-American War.

This activity was greatly increased during the World War. This inspection service has been expanded, since the organization of a Veterinary Corps, to the point that, while it does not overlap the inspection maintained by the Bureau of Animal Industry, it covers not only soundness of the article under inspection for the protection of the health of the troops but also specification requirements for the aid of purchasing officers. The authority for such detailed inspection procedures are issued by the War Department in appropriate Army regulations.

The Medical Department agencies are held accountable for the efficiency of man power. Generally speaking this is a prerogative of the Medical Corps, but the services of the Veterinary Corps are utilized as meat and meat-food inspectors. The veterinary officer is fitted for this duty by reason of his basic training.

The inspection procedure, as it were, from "the hoof to the can," is really of a dual capacity. Our chief concern is sanitary, or more familiarly referred to as soundness, which is exclusively a Veterinary Corps activity. The inspection for compliance with specifications could be done by any properly trained officer of some other branch of the Army, but such an arrangement would in reality be a duplication of work and require the presence of at least two officers to make inspection on one and the same product, one representing the Purchasing Officer or Quartermaster and the other representing the Surgeon General. This arrangement would be impracticable and not at all feasible. Consequently the inspection is done by one and the same officer, namely a Veterinary Corps officer, who must make the inspection for soundness and also render the necessary service for inspection for compliance with specifications. We refer to such inspection as a dual one, simply because it is a two-fold inspection—for soundness and specification requirements are made by one and the same person.

In addition to the soundness of the article under inspection it is probable that the technical advice the veterinary officer renders the Purchasing Officer in the inspection of articles to see that they meet contract (specification) requirements is one of the most important functions of the inspection service. If a competent inspection is made, the Purchasing Officer is assured that the articles purchased are of the quality demanded. The Army can not buy meats and meat-food products by a brand name, providing there is a federal specification covering such an article, but must advertise among authorized dealers on a competitive basis and the articles supplied must or should be in accordance with

federal specifications. Under such circumstances it is imperative that the veterinary inspector be competent to judge on the basis of a specification requirement. A faulty interpretation due to lack of knowledge, inexperience or indifference reflects on the quality accepted. The contractors or firms bidding on these supplies likewise recognize the efficiency of the inspection rendered and quote prices commensurate with the quality demanded.

The acceptance of an inferior article, or one that does not meet the requirements of specifications, has a direct bearing on the ration. The quantity of beef as the chief component of the ration is so liberally fixed that authorized meat substitutes, which are not a part of the ration, can be purchased. If the money allowance for the ration is low, due to the acceptance of an inferior grade, organization commanders will not have the money available to purchase substitutive articles which is the only means they have of varying the ration and diet. From this point of view it can be recognized readily that an inspection officer is able to render a real service toward increasing the efficiency of the Army messes.

There is, however, an honest but ill-informed minority who have taken exception to our mode of inspection, or, as they put it, merely a duplication of work. This small but persistent group reason that as long as our regulations require, except under unusual circumstances, the purchase of meat and meat products from plants having federal inspection, such subsequent inspection is unnecessary. They fail to realize, however, the perishable nature of such products and assume that any product bearing the federal stamp will meet specifications and remain sound regardless of subsequent handling. Nothing could be further from the truth. Take beef, for example. There are ten grades of carcass beef, for which the Army contracts for a specific grade, namely, good. If there was no system of inspection the contractor could bid on and deliver a much inferior grade. This consequently would reduce the quality of these foods furnished Army messes. Therefore, the inspection is one of economy as well as—and probably the more important—of soundness.

The examination of meat-food products for the Army includes animal (cattle, hogs, sheep) and poultry and dairy products. Veterinary officers must be familiar with all phases of the procurement, manufacturing, handling and processing of these products to be able to offer the necessary and proper advice. As practically all food products are purchased subject to inspection, at destination, it is necessary that a centralized point for the reception and examination of these products be made available. Carcass beef

is examined for soundness and class and inspected for grade. Beef cuts, to be acceptable, should be of the same quality and grade as called for in the specification for beef. This is true also of all other meat products. Poultry is inspected for grade and soundness. Butter and cheese also are graded. Eggs are inspected for class and candled for grade. To be able to carry on this work efficiently for soundness, as well as an assurance to Purchasing Officers that articles are being received that comply with specifications, is an activity that requires expert knowledge and considerable practical experience.

An efficient veterinary inspection of this character will demand the services of veterinary officers at all stations where Army organizations are stationed irrespective of whether or not animals are present.

Dairy Inspection

Milk being a component part of the ration, it is encumbent upon the military authorities to take every precaution possible to see that dairies authorized to furnished this product comply with certain standards. Federal specifications state:

> Dairies and milk plants supplying milk for use of the United States Army shall be subject to inspection by the Veterinary Service of the Medical Department in accordance with the provisions of Army Regulations 40-2150 and related Army Regulations.

These specifications authorize only a certain grade of milk for organization messes. Dairies must conform to standards set by public health officials in regards to the dairy cattle, barns and equipment. The maintenance of these standards and the production of milk is under the inspection and supervision of the Veterinary Corps.

Conclusion

It would be a calamity to undo the work that has so ably been begun by employing others less capable than the veterinary officer for the care and treatment of animals and the inspection of meats and meat-food and dairy products. It certainly would not be an example of advancement, but rather one of retrogression. The General Staff of our Army does not contemplate such a step and it is hardly likely that it ever will, for the very simple reason that it can now be recognized that utilization of the Army Veterinary Service for inspection of animals, animal management, forage, meat and dairy products is based primarily on the ability of the profession to recognize soundness. Utilizing this professional training as a basis, they are more eminently qualified to continue the inspection service to include specification requirements whether it be for animals, forage, or meat and dairy products.

SOME PARASITES OF OREGON WILD LIFE*

By J. N. SHAW, *Corvallis, Ore.*
Oregon Agricultural Experiment Station

INTRODUCTION

This paper was suggested by the Chairman of this Section, after he had examined a report prepared for the Oregon State Game Commission. It was his idea that the presentation of this subject here would draw attention to a new field of endeavor for the veterinarian.

The information herein has been gained as a result of a coöperation project between the Oregon State Game Commission and the Veterinary Department of the Oregon Agricultural Experiment Station. The identifications of parasites have been made by the Zoölogical Division of the U. S. Bureau of Animal Industry.

Fish sent in were mainly from places where sportsmen had found trouble. Most of the normal healthy fish examined were provided by workers connected with this laboratory.

FISH AND ANIMALS EXAMINED

A total of 200 fish were examined from 22 different sources. Ten different species were included. Parasites found included species of nine different families. The following game fish were examined: rainbow trout (*Salmo irideus*), steelhead trout (*Salmo gairdnerii*), cutthroat trout (*Salmo lewisi*). The following salmon were examined (while not classified as game fish, nevertheless they are regularly taken on light tackle): Chinook salmon (*Oncorhynchus tschawytscha*), silver-side or silver salmon (*Oncorhynchus kisutch*). Other game fish examined were Dolly Varden trout (*Salvelinus spectabiles*), brook trout (*Salvelinus fontinalis*), and small-mouth black bass (*Micropterus dolomieu*).

Several game birds and one deer were presented for examination.

PARASITES FOUND IN FISH

Nearly all specimens examined harbored parasites. Tapeworms vied with flukes for greatest numbers, although nematodes were very common. Most of the parasites were internal but some were external. In a great many cases it was difficult, if not impossible,

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to see what damage, if any, parasites were doing, but in some cases the pathology was quite apparent and in most instances parasites were numerous enough to be noticed by persons taking the fish. The veterinarian is used to eating meat from animals infested with parasites, but sportsmen know very little about such things and are quick to discard fish in which they find worms. It is all very well to explain that the cleaning of the fish removes most of the parasites and that all are destroyed by cooking. The sportsman would enjoy fishing and his fish most if he knew them to be free from parasites. In considering possible pathology produced by parasites in fish, one must remember streams are hardly comparable to pastures used by domestic animals. Fish when dead are used by other fish for food and unless deaths occur in great numbers losses might not be noticed. Let losses occur among domestic animals and notice is taken immediately.

Flukes: Flukes perhaps produced our heaviest losses. In one hatchery the Gyrodactylus sp. caused an estimated loss of 30 per cent. This external fluke about 0.5 to 0.8 mm. long lives on the fins and produces what is known as fin disease. It not only causes trouble in hatchery ponds but is found in wild water as well.

An intestinal fluke caused some losses in rainbow trout in Diamond Lake during the past summer. This fluke (*Crepidostomum cooperi*) was found in a rainbow trout from the McKenzie River, that was so near dead it was caught by hand. The same parasite was found in a Dolly Varden trout but apparently was not numerous enough to cause trouble as the fish was in good condition. Encysted forms of this fluke have been found in crayfish and immature forms in May flies.

Tapeworms: Tapeworms were very numerous in practically all species of fish examined. No losses this year could be traced directly to this group of parasites, although a few years back larval forms of *Dibothrium cordiceps* caused severe losses in one of our best lakes. This same parasite in small numbers was found in fish from several other lakes, and it would not be surprising to have it produce trouble at any time.

Nematodes: Nematodes have been found repeatedly in all our fish. While no losses have been blamed on them, in many cases they have caused great concern among the fishermen. One species, an inhabitant of the stomach and intestines, has been found in fish-eating birds and salmon. This same parasite lives in mammals such as are found in the sea.

Nearly every summer cutthroat trout are found from different sources harboring in their muscles a larval form of a nematode,

that spends its mature life in a fish-eating bird. This particular worm certainly gives the sportsman a bad turn of mind when found. Regardless of one's knowledge of parasites, one dislikes the idea of eating fish the muscles of which might contain worms. It is surprising how quickly reports of wormy fish spread. It is also surprising how long such a reputation stays with a body of incriminated water. (See figure 1.)

Fish lice: Copepods are commonly known as fish lice or sea lice. The fishermen on our coast streams believe only the fresh run fish have sea lice, but copepods are very common on fish never having the opportunity to visit the ocean. Not all copepods are parasitic and apparently not all parasitic forms are pathogenic. Recently rainbow trout sent in to this laboratory were found to be thoroughly infested. As many as 100 were removed from the gills of one fish, still it appeared to be in good condition.

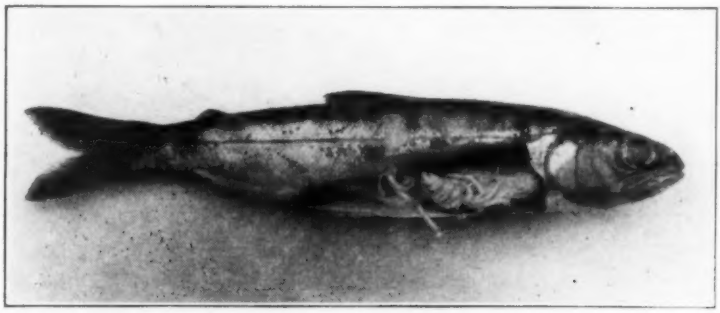

FIG. 1. Nematodes in young silverside salmon.

The copepods are of especial interest as some forms act as intermediate hosts of some of our most important parasites.

Protozoa: One important protozoan was found in fish during the year. This parasite, a myxosporidia, *Myxobolus squamae*, Keyssilitz, was found infesting the skin of a silverside salmon. It gave the fish a very unsightly appearance, which would make it unsalable. A species of this parasite has been found infesting the halibut of this coast, making these fish soft and unsalable. (See figure 2.)

PARASITES FOUND IN DEER

Only one deer was available for examination this year and the principal parasite found was the cystic form of *Taenia marginata*. This cyst is known as *Cysticercus tenuicollis*. A good share of the parasites found in deer of this State are found also in sheep and

in some counties of the State common pastures are used. Due consideration of this fact must be given in planning the eradication of these parasites.

Discussion

Considerable interest has been manifested by sportsmen and others in the progress of this investigation, especially after having a chance to see some of the specimens. Estimates have been made as to the value of the wild life in this State. More recent ones place it at $20,000,000. Here, then, is an industry having disease problems and who but the veterinarian is trained for the

Fig. 2. Protozoa in skin of mature silverside salmon.

solution of animal disease problems? Disease problems of domestic animals are so closely tied in with our forms of wild life that it is surprising our veterinary colleges have not made more of an effort to specialize their graduates in this field. One State has as many as 13 men working on wild-life management problems and, as far as the author knows, none are veterinarians. Most land-grant institutions have organizations well fitted to cope with wild-life problems. No reason exists for expecting one kind of scientist to handle all phases. In a great many cases there will be need for the services of a chemist, a botanist, the bacteriologist, the engineer, and certainly the man trained in the study of disease. Every effort should be made to coördinate these

different groups so they will coöperate in handling the problems of an industry having possibilities of increasing five-fold in the next ten years. The veterinarian must be trained to take his place in the organization.

Conclusions

No attempt has been made to cover the field of endeavor made possible by the coöperative project. It is hoped that the ideas presented will be a stimulus to those training veterinarians. No attempt has been made to review the available literature, so no references are given.

Veterinarians Still on Guard

While pigs are being slaughtered to reduce the surplus and the slaughter of certain types of cattle is being considered by the government, it is heartening to know that our old friends, the veterinarians, are still on the job, dependable as ever, trying to keep what live stock is permitted to live healthy so the "surplus" of consumers won't be reduced. Attesting their conscientiousness in discharging their responsibilities to society is the fact that some 150 veterinarians are attending the Eastern Iowa Veterinary Association's annual convention, to which Cedar Rapids is host this week.

These men take their work seriously, and their earnest efforts to keep abreast of technical progress in their profession and the changing aspects of their problems fully warrant the unquestioning confidence the consuming public places in them. Tuesday they devoted considerable time to discussion of new Iowa live stock regulations the existence of which is not even suspected by the majority of people the regulations are designed to protect. They gave even more time to familiarizing themselves with new developments in the treatment of animal diseases of which the general public is equally ignorant.

Much attention is being given these days to the question of whether there isn't too much live stock for the economic good of the country. Both public and government attention is diverted for the time being from the far more important question of whether the live stock we have will supply meat and milk fit for consumption. It is distinctly encouraging, therefore, that in the midst of all the current confusion a group of alert, well-trained men is bending every effort to assure an affirmative answer to that latter question.—Editorial in Cedar Rapids (Ia.) *Gazette*.

STUDIES ON CANINE DISTEMPER

IV. Immunization of Dogs by Means of Bacterial Products*

By A. S. SCHLINGMAN, *Detroit, Mich.*
Research and Biological Laboratories
Parke, Davis and Company

A résumé of the literature[1-7] and results of researches recently reported by the author[8-10] indicate that at least two diseases of the dog are called distemper. One of these, prevalent in the Detroit area of the United States, was found to be caused, in the majority of instances, by *Bacillus bronchisepticus*, an organism first described and named by Ferry.[2] The other, due to a filtrable virus, first reported by Carré[1] and more recently by Dunkin and Laidlaw,[6,7] was not encountered among the cases taken for study in recent experiments.[9]

Tests to determine the degree of immunity to filtrable virus disease of animals recovered from *B. bronchisepticus* distemper showed that no protection was afforded against the filtrable virus distemper and, *vice versa*, recovery from infection with the virus did not immunize the animals against infection with *B. bronchisepticus*.

Since Ferry[2] reported on the casual agent of distemper in dogs, it has been shown that dogs could be immunized against this infection by means of a serum obtained from horses hyperimmunized with *B. bronchisepticus*. This immunity could be stimulated further by use of a bacterin made from this organism and fortified by the addition of staphylococci and streptococci so frequently found as secondary invaders.

Although these products have been used with excellent results for a number of years for prevention and treatment of distemper in dogs, the more recent reports and the results of studies of naturally infected cases of the disease made additional data desirable.

Included in this report are the results of immunization of normal dogs raised in quarantine as well as a number of dogs obtained from the city dog pound intended for tests which were to continue over a considerable period of time.

In the case of the dogs raised in quarantine, immunization was carried out by the simultaneous subcutaneous injection of anti-bronchisepticus serum (2 cc per kg of body weight) and 1.0 to

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2.0 cc of the bacterin. A second and a third injection of the bacterin were given at intervals of three to four days, the amount injected being increased from 50 to 100 per cent, depending on the general condition and size of the dog as well as on the reaction obtained from the previous injection.

These dogs were held in quarantine for at least two weeks after the last injection, when they were removed to other quarters and exposed to infection by contact with naturally infected cases. This period of contact, in most instances, was five days, during which time the treated dogs were confined in the same cage with the infected animal. All were required to eat and drink from the same vessels. This method of exposure was exceptionally severe and presents possibilities of infection considerably greater than would occur under natural conditions.

In most cases the naturally infected dog was destroyed for autopsy and bacteriological examination at the end of the period of contact, while the exposed dogs were held for varying periods of time to determine their susceptibility to distemper and later released.

The dogs obtained from the city dog pound were regarded as having been exposed to distemper at the time of receipt at the laboratory. Some of these animals undoubtedly were in the period of incubation at the time of receipt and of the first injection of serum and bacterin since, in several instances, symptoms of distemper were seen one or two days after the use of the biologicals.

The prophylactic treatment of these animals was the same as that used for the dogs raised in quarantine. When symptoms of distemper were shown within a day or two following the first injection of serum and bacterin, the dosage of serum was repeated daily or at less frequent intervals until the temperature returned to normal and other symptoms subsided. Bacterin treatment was continued at 3- or 4-day intervals, the amounts injected being increased somewhat depending on the reactions obtained from the previous injection as well as on the condition of the animal.

The following protocols show the methods of immunization and results obtained in the various dogs used in these tests. Case histories of untreated controls also are included.

Dog 2: Age 6 weeks. Weight 6 lbs. Country bred.
4-27 6 cc antibronchisepticus serum and 1 cc bacterin.
4-30 2 cc bacterin.
5- 4 3 cc bacterin.
5-19 Slight cough and mucous secretions from nose. Infection undoubtedly carried by attendant. Normal after 3 days.

5-25 Contact with naturally infected dog. Kept in infected quarters until 12-28. No evidence of distemper during this time.

Dog 28: Age 6 weeks. Weight 6 lbs. Country bred.
4-27 6 cc antibronchisepticus serum and 1 cc bacterin.
4-30 2 cc bacterin.
5- 4 3 cc bacterin.
5-25 Contact with naturally infected dog.
6- 2 Slight sneezing with very slight mucous nasal discharge lasting 3 days. Constantly exposed to infection until 9-30. No evidence of distemper. Later proved to be susceptible to virus infection (Dunkin and Laidlaw).

Dog 9: Age 6 weeks. Weight 5 lbs. Country bred.
5-28 5 cc antibronchisepticus serum and 1 cc bacterin.
6- 1 2 cc bacterin.
6- 6 3 cc bacterin.
6-24 Contact with naturally infected dog.
7-14 Slight mucous nasal discharge which persisted 6 days. Constantly exposed to distemper until 9-30 without further evidence of infection. Later proved to be susceptible to virus infection (Dunkin and Laidlaw).

Dog 10: Age 6 weeks. Weight 5 lbs. Country bred.
5-28 5 cc antibronchisepticus serum and 1 cc bacterin.
6- 1 2 cc bacterin.
6- 6 3 cc bacterin.
6-24 Contact with naturally infected dog.
7-14 Slight serous nasal discharge which was intermittent to 7-19, when dog was normal. Constantly exposed to distemper until 9-30. No evidence of disease during this time. Later proved to be susceptible to virus infection (Dunkin and Laidlaw).

Dog 11: Age 6 weeks. Weight 5 lbs. Country bred.
5-28 5 cc antibronchisepticus serum and 1 cc bacterin.
6- 1 2 cc bacterin.
6- 6 3 cc bacterin.
6-24 Contact with naturally infected dog.
7-14 Slight serous nasal discharge which persisted to 7-24. Constantly exposed to distemper until 9-30. No evidence of disease during this time. Later proved to be susceptible to infection with virus (Dunkin and Laidlaw).

Dog 18: Age 6 weeks. Weight 5 lbs. Country bred.
Held in quarantine with dogs 9, 10 and 11. No treatment.
6-24 Contact with naturally infected dog (with dogs 9, 10 and 11).
7- 6 Serous ocular and nasal discharge.
7- 7 Gray mucous nasal discharge. No diarrhea. Illness continued until 7-16, when death occurred.

Dog 54-N: Age 5 months. Weight 24.5 lbs. Country bred.
Held in quarantine since 6 weeks of age.
2- 4 2 cc bacterin.
2- 8 4 cc bacterin.
2-22 6 cc bacterin. Held in quarantine until 4-29, when placed in contact with naturally infected dog. Constantly exposed to distemper until 5-30, when used for another experiment. No evidence of infection to 9-29.

Dog 55: Age 5 months. Weight 22.5 lbs. Litter mate to dog 54-N.
Held in quarantine and treated same as dog 54-N. Remained normal after 30 days of constant exposure to distemper, when released for other tests.

Dog 62: Age 5 months. Weight 29.5 lbs.
Held in quarantine from age of 6 weeks, with dogs 54-N and 55. No treatment.
4-29 Exposed to distemper by being placed in infected quarters.
5- 7 Removed to country. No contact with other dogs.
5-10 Developed symptoms of distemper. No treatment.

Dog 64: Age 5 months. Weight 17 lbs.
Held in quarantine from age of 6 weeks with dogs 54-N, 55 and 62. No treatment.
4-29 Exposed to distemper by being placed in infected quarters.
5-10 Symptoms of distemper.
6- 7 Recovering.

Dog 6-N: Age 6 months. Weight 21 lbs.
Developed distemper 1 week after arrival at laboratory from city dog pound.
11-17 T. 103.6° F. Mucopurulent ocular and nasal discharges. 20 cc antibronchisepticus serum and 1 cc bacterin.
11-18 T. 102° F. No nasal or ocular discharges. 20 cc antibronchisepticus serum.
11-19 T. 102.4° F. Very slight mucopurulent nasal discharge. 20 cc antibronchisepticus serum.
11-21 T. 104.2° F. Slight mucopurulent discharge from left eye. Appetite good. 20 cc antibronchisepticus serum and 2 cc bacterin.
11 23 T. 101.6° F. Improving. 20 cc antibronchisepticus serum.
11-24 T. 103° F. Slight mucopurulent nasal and ocular discharges. 20 cc antibronchisepticus serum and 3 cc bacterin. No further treatment.
12-10 Normal.

Dog 7-N: Age about 8 months. Weight 22 lbs.
Prophylactic treatment begun on day of arrival from city pound.
11-17 T. 101.6° F. 20 cc antibronchisepticus serum and 1 cc bacterin.
11-18 T. 100.4° F.
11-21 T. 100° F. 2 cc bacterin. No evidence of distemper to 12-30, although exposed several times.

Dog 8-N: Age about 6 months. Weight 18 lbs.
Prophylactic treatment begun on day of arrival from city pound.
11-17 T. 102° F. 20 cc antibronchisepticus serum and 1 cc bacterin.
11-18 T. 101.6° F.
11-19 Temperature not recorded. Animal normal.
11-21 T. 101.8° F. 2 cc bacterin. No evidence of distemper to 2-6, although exposed several times.

Dog 9-N: Age about 6 months. Weight 21 lbs.
Had been sick about 1 week when treatment was begun.
11-17 T. 101.8° F. Mucopurulent nasal and ocular discharges. Cough. Nostrils covered with dried secretions. 20 cc antibronchisepticus serum and 1 cc bacterin.
11-18 T. 102° F. Nasal and ocular discharges not so profuse.
11-19 T. 101.8° F. Slight mucopurulent nasal discharge. Eyes clear. 10 cc antibronchisepticus serum.
11-21 T. 102.8° F. Slight mucopurulent nasal and ocular discharges. Appetite good. 20 cc antibronchisepticus serum and 2 cc bacterin.
11-23 T. 102° F. Slight improvement. 20 cc antibronchisepticus serum.

11-24 T. 101.4° F. Eyes clear. Very slight serous nasal discharge. No further treatment.
11-30 Recovered. No further evidence of infection until 1-20, although exposed several times.

Dog 10-N: Age about 8 months. Weight 20 lbs.
Suffering from distemper about 2 weeks before treatment was begun. Mucopurulent nasal discharge, cough, rapid respiration, marked keratitis. Poor appetite.
11-17 20 cc. antibronchisepticus serum and 1 cc bacterin.
11-18 T. 102.4° F. No change in symptoms.
11-19 T. 101° F. Dicharges not so marked.
11-21 T. 104° F. No change. 20 cc antibronchisepticus serum.
11-23 T. 102° F. Eyelids sealed with dried discharges. Mucopurulent nasal discharge. Rapid labored respiration. Keratitis very marked. Moribund. Destroyed.

Dog 11-N: Age about 6 months. Weight 22 lbs.
Treatment begun on day of arrival from city pound.
11-17 T. 102° F. 20 cc antibronchisepticus serum and 1 cc bacterin.
11-18 T. 102.2° F.
11-21 T. 102.4° F. 2 cc bacterin. No further treatment. No evidence of infection to 1-15, although exposed several times.

Dog 12-N: Age about 6 months. Weight 23 lbs.
Held in infected quarters about 2 weeks before treatment was begun.
11-17 T. 101.8° F. Slight serous nasal discharge. 20 cc antibronchisepticus serum and 1 cc bacterin.
11-18 T. 101.4° F. Apparently normal.
11-21 T. 101° F. 2 cc bacterin. No evidence of infection, although exposed more or less constantly until 12-30.

Dog 4: Age about 6 months. Weight 25 lbs.
10-27 Received from city pound.
10-30 First symptoms of distemper shown. Received no treatment.
11-17 Died.

Dog 1: Age about 8 months. Weight 20 lbs.
11-25 Received from city pound.
12- 2 Developed distemper. Not treated. Destroyed.

Dog 100-G: Age about 6 months.
12- 2 Sick about 1 week. T. 104° F. Mucopurulent nasal discharge, cough, slight emaciation. 20 cc antibronchisepticus serum and 1 cc bacterin subcutaneously.
12- 3 T. 104.8° F. Discharges from nose very slight.
12- 5 T. 101.8° F. No discharges. 20 cc antibronchisepticus serum and 2 cc bacterin.
12- 8 T. 101° F. No discharges. 3 cc bacterin. No further treatment. Recovery rapid. No evidence of further infection for 11 months, although exposed frequently.

Dog 101-G: Age about 6 months. Weight 20 lbs.
Received with dog 100-G and kept in adjacent cage.
12- 2 20 cc antibronchisepticus serum and 1 cc bacterin.
12- 5 2 cc bacterin.
12- 8 3 cc bacterin. No evidence of distemper during ensuing 6 months, although frequently exposed.

Dog 102-G: Age about 6 months. Weight 18 lbs.
Received with dogs 100-G and 101-G and kept in adjacent cage.
12- 2 20 cc antibronchisepticus serum and 1 cc bacterin.
12- 5 2 cc bacterin.

12- 8 3 cc bacterin. No evidence of distemper during 6 months of observation, although frequently exposed.

Dog 103-G: Age about 6 months. Weight 21 lbs.

12- 3 Received from city pound. No evidence of distemper. T. 102° F. 20 cc antibronchisepticus serum and 1 cc bacterin.
12- 5 T. 103.6° F. Slight cough, grayish mucous nasal discharge. 20 cc antibronchisepticus serum and 2 cc bacterin.
12- 7 T. 102° F. Rapid respiration, copious mucous nasal discharge. No appetite.
12- 8 T. 101° F. Respiration normal. Slight mucous nasal discharge. 20 cc antibronchisepticus serum and 3 cc bacterin.
12- 9 T. 100.8° F. Respiration normal. Slight nasal discharge. Appetite good. 20 cc antibronchisepticus serum.
12-11 T. 100.8° F. Improving. 20 cc antibronchisepticus serum.
12-15 T. 101° F. Very slight mucous nasal discharge. 20 cc antibronchisepticus serum.
12-18 Apparently normal. No further evidence of distemper during ensuing 6 months, although exposed several times.

Dog 104-G: Age about 6 months. Weight 21 lbs.

Treatment begun on day of arrival from city pound. Apparently normal. Kept in cage next to dog 103-G.
12- 3 T. 101.4° F. 20 cc antibronchisepticus serum and 1 cc bacterin.
12- 5 Normal. 2 cc bacterin.
12- 8 Normal. 3 cc bacterin. No evidence of infection, although exposed several times during ensuing 6 months.

Dog 99-G: Age about 6 months. Weight 25 lbs.

11-17 Received from city dog pound.
11-20 Developed distemper. No treatment.
12- 3 Died.

Dog 23-N: Age about 6 months. Weight 18 lbs.

2-19 Received from city pound.
2-20 20 cc antibronchisepticus serum and 1 cc bacterin.
2-23 4 cc bacterin.
2-26 6 cc bacterin. Swelling at site of last injection of bacterin persisted for 5 days. Although exposed almost constantly, there was no evidence of distemper for 30 days.

Dog 24-N: Age about 6 months. Weight 20 lbs.

2 19 Received from city pound.
2-20 20 cc antibronchisepticus serum and 2 cc bacterin.
2-23 4 cc bacterin.
2-26 6 cc bacterin. Swelling at site of last injection of bacterin persisted for 6 days. Although exposed several times, no evidence of distemper up to 3-12, when death occurred during general anesthesia.

Dog 25-N: Age about 8 months. Weight 23 lbs.

2-19 Received from city pound.
2-20 20 cc antibronchisepticus serum and 2 cc bacterin.
2-23 4 cc bacterin.
2-26 6 cc bacterin. Swelling at site of last injection of bacterin persisted for 6 days. No evidence of distemper up to 11-17, although exposed several times during this period.

Dog 26-N: Age about 6 months. Weight 18 lbs.

2-19 Received from city pound.
2-20 20 cc antibronchisepticus serum and 2 cc bacterin.
2-23 4 cc bacterin.

2-26 6 cc bacterin. Swellings of varying intensity developed after each injection of bacterin, that from the last injection lasting about 6 days. No evidence of distemper up to 8-30, although exposed several times.

Dog 28-N: Age about 6 months. Weight 21 lbs.
Treatment begun on day of arrival from city pound.
4-15 20 cc antibronchisepticus serum and 1 cc bacterin.
4-18 2 cc bacterin.
4-21 2.5 cc bacterin. Swelling at site of last injection of bacterin persisted 5 days. No evidence of distemper up to 11-17.

Dog 30-N: Age about 8 months. Weight 28 lbs.
7-22 Received from city pound.
7-25 One adrenal gland removed.
8- 4 30 cc antibronchisepticus serum and 1 cc bacterin.
8- 7 2 cc bacterin. No evidence of distemper up to 8-9, when death occurred while under anesthesia.

Dog 31-N: Age about 6 months. Weight 30 lbs.
7-22 Received from city pound.
7-25 One adrenal gland removed.
8- 4 30 cc serum and 1 cc bacterin.
8- 9 2 cc bacterin. No evidence of distemper up to 8-24. Held in cage next to dog 32-N.

Dog 32-N: Age about 6 months. Weight 25 lbs.
7-22 Received from city pound.
7-25 One adrenal gland removed.
7-27 Developed distemper. No treatment until 8-4.
8- 4 30 cc antibronchisepticus serum were injected. T. 102.2° F. Cough, loss of appetite, copious mucopurulent nasal discharge, slight ocular discharge of same character. No diarrhea. Operation wound infected.
8- 5 Moribund. Destroyed.

Dog 33-N: Age about 6 months. Weight 28 lbs.
7-22 Received from city pound.
7-25 One adrenal gland removed. Held in cage next to dog 32-N. No treatment until 8-4.
8- 4 T. 101.4° F. Slight cough, watery nasal discharge. Injected 30 cc antibronchisepticus serum and 1 cc bacterin.
8- 9 Apparently normal. 2 cc bacterin. No further evidence of distemper up until 1-27, although frequently exposed.

Dog 34-N: Age about 6 months. Weight 20 lbs.
8-13 Received from city pound. Exposed to infection constantly.
8-20 30 cc antibronchisepticus serum and 1 cc bacterin.
8-23 T. 102.6° F. 2 cc bacterin.
8-24 T. 102.8° F.
8-25 T. 102.6° F.
8-26 T. 101.8° F.
8-27 T. 103.4° F. Mucous nasal discharge.
8-29 T. 105.6° F. Cough, mucous nasal and ocular discharges, 30 cc antibronchisepticus serum.
8-30 T. 104° F. No change in symptoms.
8-31 T. 104° F. No change in symptoms except very weak.
9- 1 Dead.

Dog 37-N: Age about 6 months. Weight 25 lbs.
8-26 Received from city pound. Kept in infected quarters until 9-15.
8-31 30 cc antibronchisepticus serum and 1 cc bacterin.
9- 3 2 cc bacterin.
9- 6 4 cc bacterin.

9-15 One adrenal gland removed. Apparently normal until 9-20, when temperature was 102° F. Slight cough and mucopurulent nasal discharge.
9-21 T. 100.4° F. Slight keratitis left eye, serous nasal discharge, no cough. 30 cc antibronchisepticus serum.
9-22 T. 100.2° F. Left eye normal, mucous discharge from right. Slight cough, mucopurulent nasal discharge. 30 cc antibronchisepticus serum.
9-23. T. 100.2° F. Serous nasal discharge. No other change in symptoms. 30 cc antibronchisepticus serum.
9-24 T. 101.2° F. Mucous ocular discharge, mucopurulent nasal discharge, no cough, good appetite. 30 cc antibronchisepticus serum.
9-26 T. 101° F. Serous nasal discharge. 3 cc bacterin.
9-27 T. 101° F. Apparently normal.
10- 3 No further evidence of infection. Second adrenal gland removed.
10- 4 Aborted 2 pups.
10-26 Died—septicemia.

Dog 38-N: Age about 6 months. Weight 30 lbs.
9- 2 Received from city dog pound. Held in infected quarters until 9-28.
9- 6 30 cc antibronchisepticus serum and 1 cc bacterin.
9- 9 2 cc bacterin.
9-13 4 cc bacterin.
11-17 No evidence of distemper.

Dog 39-N: Age about 8 months. Weight 30 lbs.
9- 2 Received from city pound and kept in infected quarters up to 9-15. 30 cc antibronchisepticus serum and 1 cc bacterin.
9- 6 2 cc bacterin.
9- 9 4 cc bacterin.
11-17 No evidence of infection.

Dog 40-N: Age about 6 months. Weight 30 lbs.
9- 2 Received from city pound and kept in infected quarters until 9-22.
9- 6 30 cc antibronchisepticus serum and 1 cc bacterin.
9- 9 2 cc bacterin.
9-13 4 cc bacterin.
11-17 No evidence of distemper.

Dog 42-N: Age about 6 months. Weight 22 lbs.
9-30 Received from city pound and held in infected quarters until 10-15.
10- 3 20 cc antibronchisepticus serum and 1 cc bacterin.
10- 5 2 cc bacterin.
10-10 4 cc bacterin.
11-17 No evidence of distemper.

Dog 43-N: Age about 8 months. Weight 23 lbs.
9-30 Received from city pound and held in infected quarters until 10-15.
10- 3 20 cc antibronchisepticus serum and 1 cc bacterin.
10- 5 2 cc bacterin.
10-10 4 cc bacterin.
11-17 No evidence of infection.

Dog 45-N: Age about 6 months. Weight 25 lbs.
10-28 Received from city pound and kept in infected quarters. First treatment given on day of arrival. 25 cc antibronchisepticus serum and 1 cc bacterin.

10-31 2 cc bacterin.
11- 2 4 cc bacterin.
11-17 No evidence of infection.

Discussion

The consensus of opinion relative to prophylactic immunization of dogs against distemper seems to be that, for best results, dogs should be at least three months of age before such treatment is begun. If prophylactic treatment is given at an earlier age, the immunity which results may not be so great as that obtained later. This is borne out by the results obtained in dogs 2, 28, 9, 10 and 11, which were only about six weeks of age at the time of the first injection of serum and bacterin. These pups were not entirely protected, since they did show some slight symptoms of distemper following exposure two weeks after the last injection but the infection was slight, since these symptoms persisted only a few days. No further evidence of infection developed, although this group was constantly exposed for three months or more, new dogs having been brought in at weekly intervals. Following this constant exposure these pups were found later to be susceptible to infection[10] with the virus of distemper described by Dunkin and Laidlaw.[6] An untreated pup (18) which had been held in quarantine with this group, prior to and during the immunization period, and exposed to infection at the same time, developed distemper and died after an illness of ten days.

It is evident that greater immunity is obtained in the older dogs, as shown by the results obtained with dogs 54-N and 55. These dogs were five months of age when treatment was begun and had been held in quarantine since the age of six weeks. They were not exposed to infection for two months after completion of the prophylactic treatment. Notwithstanding the fact that they were kept five days in the same cage with a dog suffering from distemper and were then constantly exposed to the disease for an additional 25 days, no evidence of infection was seen. One dog (54-N) was observed for five months, and although exposed several times during this period, showed no evidence of distemper.

In contrast to these results, two untreated dogs (62 and 64), which had been kept with dogs 54-N and 55 during the entire quarantine period and exposed to infection by placing them in infected quarters, developed distemper ten days later. Dog 62 was destroyed after 17 days of illness because of the severity of the symptoms, while dog 64 was on the road to recovery after 30 days.

The dogs intended for experiments, in which it was desirable to hold them for a considerable period of time, were regarded as having been exposed to distemper at the time of arrival at the laboratory.

For the most part prophylactic treatment of these dogs was begun on the same day or within a day or two after arrival but in a few instances the dogs were placed on the experiments without any preventive treatment and later developed distemper. In these cases it was necessary to treat the animals but in no case were any medicinal agents used. No special diet or nursing was given. The treatment consisted solely of subcutaneous injections of antibronchisepticus serum and mixed bacterin.

The results obtained following the use of this serum and bacterin in dogs 6-N, 9-N, 100-G, 103-G and 33-N indicate that when given in the early stages of the disease, marked beneficial effects follow. On the other hand, when the disease is well established before treatment is instituted, little or no beneficial results may be obtained from the use of the biologicals as was the case with dogs 10-N and 32-N. In neither of these cases nor in dog 34-N, referred to later, were there any symptoms seen which would indicate infection with the filtrable virus described by Dunkin and Laidlaw.[6] In each of these cases the diagnosis of distemper was made on clinical symptoms and was not confirmed by either bacteriological cultures or animal inoculation.

The dogs given preventive treatment were held in quarters where distemper was constantly present, new dogs from outside sources being brought in once each week. One attendant cared for all the dogs and no special effort was made to guard against spread of infection other than by cleanliness and frequent disinfection of the premises. Under such conditions excellent results were obtained in most instances, but in a few, like dog 34-N, a sufficient amount of immunity was not produced to counteract the infection which was apparently present when treatment was begun.

Untreated dogs received and held under the same conditions as those treated almost invariably developed distemper. The incidence of the disease among the dogs obtained for laboratory use has been so great that where it was desirable to hold these animals for a long period of time, experiments were greatly interfered with by the onset of the disease. By systematic prophylactic treatment with antibronchisepticus serum and bacterin of all dogs intended for these experiments, it has been possible to control the disease.

In some cases dogs included in this report (see numbers with suffix N) were placed on experiments where it was necessary to remove the adrenal glands. Investigations of various workers show that the resistance of adrenalectomized dogs to infection is very low. This fact no doubt accounts, in part at least, for the results obtained following prophylactic treatment of dog 37-N. In this case one adrenal was removed nine days after the last prophylactic treatment. Five days later, symptoms of distemper developed which were controlled by the further use of antibronchisepticus serum and bacterin. Undoubtedly, symptoms of distemper were due to a latent infection which became active when the resistance was lowered by removal of one adrenal. Further evidence of lowered resistance to infection was shown by the fatal metritis which followed an accidental abortion subsequent to removal of the second adrenal gland.

Regardless of the fact that the resistance of a number of these dogs was undoubtedly lowered by the removal of the adrenals, yet the immunity produced by the injection of the antibronchisepticus serum and the bacterin was sufficient to protect them against distemper, although exposure occurred on several occasions.

The serum injected in these cases was tolerated exceptionally well, complete absorption occurring within 24 hours. In no case were any symptoms of anaphylaxis seen. The injection of the bacterin in most cases produced considerable local reaction characterized by a sensitive hard swelling at the site of injection. The intensity of these reactions did not vary according to the size of the dose but varied with the individual. Where such local reactions did occur, there was a tendency for gradual disappearance, many of them persisting for as long as five to six days.

SUMMARY

Protocols showing the results of immunization of dogs against distemper by means of antibronchisepticus serum and bacterins made from *Bacillus bronchisepticus*, streptococci and staphylococci are given.

Some of the dogs used in these immunization tests had been raised in quarantine and were not subjected to infection until some time had elapsed for development of immunity. Others, on account of conditions present before selection for experimental work, were regarded as having been exposed to distemper prior to prophylactic treatment. In most of these cases, the simultaneous administration of antibronchisepticus serum and mixed

bacterin followed by subsequent doses of bacterin alone was followed by immunity to distemper. In a few cases, where the dogs were in the period of incubation at the time the first prophylactic injection was given, symptoms of distemper developed within a few days after the administration of these biologicals. In most of these cases marked beneficial results followed the repeated administration of the serum and bacterin. Although the resistance to infection of many of these dogs was lowered by the removal of the adrenal glands the immunity which developed as a result of the injection of the biological products used, was sufficient, with few exceptions, to protect the animals against distemper, even though they were exposed frequently.

Conclusions

From the tests to determine the immunity of dogs treated with antibronchisepticus serum and mixed bacterin against infection by exposure to naturally infected dogs, the following conclusions may be drawn:

1. The immunity conferred in extremely young pups (6 weeks) by these products may not be sufficient to protect them entirely against exposure by close contact with a naturally infected case for a long period of time. If infection should take place under such circumstances, the disease may be of short duration.

2. A solid immunity to natural infection can be conferred by these products to older dogs held in quarantine for a long time for development of immunity before exposure to the disease.

3. In exposed dogs, symptoms of distemper may develop within a few days after the first prophylactic dose of antibronchisepticus serum and mixed bacterin. In most of these cases, frequent repeated doses of these products are followed by beneficial results, the duration of the disease being shortened and a solid immunity to natural infection being produced.

4. Adrenalectomized dogs, which investigators consider as possessing a lowered resistance to infection, were for the most part protected against distemper by antibronchisepticus serum and mixed bacterin.

5. Distemper can be controlled in dogs intended for experiments to extend over a considerable period of time, by the systematic use of antibronchisepticus serum and mixed bacterin.

6. The results of these experiments indicate that antibronchisepticus serum and bacterins made from *Bacillus bronchisepticus*,

streptococci and staphylococci are of great value in the control and treatment of distemper as it occurs under natural conditions.

7. Since distemper of dogs as it occurs under natural conditions can be controlled by the use of antibronchisepticus serum and mixed bacterin and since marked curative properties are possessed by these products, the results of these experiments tend to prove further the results of previous studies, that the majority of naturally infected cases of dog distemper are caused by *Bacillus bronchisepticus*.

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DISCUSSION

DR. N. J. PYLE: I am quite appreciative of the work Dr. Schlingman has been doing and his final report, made here today, has been anticipated. Dr. Schlingman has maintained, throughout a period of years, that canine distemper, in a majority of cases, is caused by *Bacillus bronchisepticus*. I cannot help but admire the faith he has in his work and his contention in this respect, because he stands alone in this theory of the etiology of canine distemper.

Evidence will be given here this morning to the effect that canine distemper is caused primarily by a filtrable virus. In previous reports, Dr. Schlingman has intimated that the filtrable virus infection, with which we are dealing in this country, is an experimental distemper, and if such a virus actually exists here, it has been introduced from England. If such is the case, it is of country-wide distribution and has crossed our borders into Canada, Mexico and Central American countries.

With regard to immunization against this disease with bacterins or killed suspensions of the bacterial invaders, the work of Hardenbergh,* as published in the proceedings of the 1925 meeting of the A. V. M. A., has either purposely or unintentionally been ignored. He used such products on 493 dogs over a period of four years and concluded that they were worthless as immunizing agents against distemper. Similar results have been obtained by numerous small-animal practitioners. The distemper bacterin has long since been relegated to the past.

*Hardenbergh, J. G.: The significance of *Bacillus bronchisepticus* in cases of canine distemper. Jour. A. V. M. A., lxviii (1925), n. s. 21 (3), pp. 309-320.

There is no doubt as to the filtrable virus etiology of canine distemper. The evidence to that effect is convincing and voluminous. Accordingly, we must use the virus as an immunizing agent, and it must be in the living form if we are to obtain a complete and long-lasting immunity. Dr. McBryde, who is noted for his pioneer work on hog cholera and who will speak to us later, would not think of using the secondary invaders of hog cholera to immunize against that disease. You perhaps are familiar with the work of Dochez, of Columbia University, who reported at the recent American Medical Association convention in Milwaukee that the common cold and possibly influenza are due to the combined action of a filtrable virus and secondary invading bacteria commonly found in the upper respiratory tract. With regard to immunization against these two human diseases, he pointed out that protection cannot be induced by vaccinating with the bacterial invaders, and that the solution of preventing epidemic respiratory disease would undoubtedly lie in vaccinating with the initiating agent—the virus itself.

We have another excellent example in the work on swine influenza, coming from the Rockefeller Institute at Princeton, N. J. This disease is caused by the combined action of a filtrable virus and *Bacillus influenza suis*. Immunization completely fails when the latter is used as an antigen, but with the filtrable virus there is produced a solid and durable protection.

In conclusion, there is no doubt in my mind but that in some instances *B. bronchisepticus* can and does produce infection without the co-existence of the filtrable virus of canine distemper. However, abundant data indicate that in the majority of cases of canine distemper this organism is secondary to a preliminary and debilitating filtrable virus infection. Moreover, there are on record tens of thousands of cases where a solid and durable immunity has been produced with the use of the filtrable virus as the immunizing agent.

DR. L. H. SCRIVNER: With regard to the widespread effects of canine distemper, we all, I think, recognize distemper in New York, San Francisco and Detroit. We have it all over the country and with our present-day methods of transportation for and traffic in dogs, I cannot see why distemper in New York, Detroit or San Francisco should not be the same. As far as the filtrable virus as the causal agent is concerned, I do not doubt that there is a filtrable virus disease, because I have done some work with it, but I have found that the symptoms which appear during incubation are caused entirely by *Bacillus bronchisepticus* infection. During all my work with these cases of canine distemper and the immunization of dogs against distemper, I have not encountered the filtrable-virus disease among the dogs, but I have been able to protect our dogs against distemper by means of the bacterial products. From some work that I did several years ago, it would seem to indicate that there is no crossing between the filtrable virus infection and *Bacillus bronchisepticus* infection.

Locations in Oklahoma

Dr. Walter H. Martin, secretary of the Oklahoma State Board of Veterinary Medical Examiners, is authority for the statement that there are 36 counties in Oklahoma without a graduate veterinarian. Veterinarians seeking locations in Oklahoma may communicate with Dr. Martin at 101 South Evans, El Reno, Okla.

THE BACTERIOLOGY OF SPLEENS IN THE PREPARATION OF THE LAIDLAW-DUNKIN CANINE DISTEMPER PROPHYLACTIC*

By NORMAN J. PYLE, *Pearl River, N. Y.*
Lederle Laboratories, Inc.

Apparently the etiology of canine distemper is still a moot question. Although certain investigators within recent years have demonstrated most conclusively that the factor is a filtrable virus, there still persists the thought that *Alcaligenes bronchisepticus* (Ferry) is the causative agent.

However, all students of this disease do agree on three points; namely, that *A. bronchisepticus* is a pathogen, that it is prominently associated with the disease, at least as a secondary invader, and that, *at certain stages* during the course of canine distemper, it can be isolated almost at will from the tissues.

It cannot be denied that the spleens of distemper-infected dogs contain the causative agent. We have produced the infection in at least four to five thousand puppies, several hundred so-called adult dogs, and approximately one thousand ferrets, by inoculation with suspensions of spleen tissue taken from infected dogs and ferrets. In our work, spleen tissue only is used for this purpose. It is also the lone source of the Laidlaw-Dunkin canine distemper tissue vaccine and desiccated virus.

It is obvious that the results of a careful biological analysis of these spleens would indicate what the cause of distemper might be—a filtrable virus or *A. bronchisepticus*. Accordingly, it is the purpose of this paper to report the results of a routine examination of several weeks' supply of spleens taken from infected puppies, adult dogs, and ferrets.

TECHNIC

To begin with, it must be admitted that we firmly believe a filtrable virus to be the causative agent of canine distemper. It has been demonstrated by others, and repeatedly confirmed by us, that the greatest concentration of this virus is found in the spleen approximately ten to twelve days after the dog has been infected by natural or artificial means.

As we now know canine distemper, it has an incubation period of four days. At this interval after infection, the temperature rises two or three degrees, but descends to the normal range

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within 24 to 36 hours. Two or three days later it again rises, this time more gradually, until on or about the tenth to eleventh day it has reached a higher level than that of the first rise and simultaneously there appear the characteristic distemper conjunctivitis and rhinitis.

It is at this point that the spleen contains its highest concentration of the virus and, accordingly, it is removed at this time. If the operation be delayed, the spleen content of virus will become lessened and vitiated. The temperature curve of an infected dog, therefore, is depended upon as a diagnostic procedure as well as an index for determining when the spleen should be removed.

In removing the organ, the dog is chloroformed, the abdominal and thoracic areas washed down with a coal-tar preparation, an incision made along the linea alba from the sternum to the pubis, the abdominal skin, muscles, and peritoneum laid aside, the spleen removed with sterile instruments, and transferred to a large sterile potato tube preparatory to its bacteriological examination.

The removal of the spleen in the ferret is accomplished in the same manner. In this animal the incubation period is about eight days. A swelling of the paws and eyelids and a reddening of these areas are characteristic. These symptoms are preliminary to a sero-mucous discharge from the eyes and nostrils. Distemper in the ferret runs a rapid course without the development of secondary infections and the spleen is removed on or about the eleventh or twelfth day when the animal is moribund.

In making the bacteriological examination, the spleen is transferred from the potato tube to a sterile crystal dish, five inches in diameter and two and one-half inches deep. A small surface of the tissue then is seared with the heated blade of a spatula, an incision made into the pulp of the organ with a sterile knife-blade, and smears made upon agar plates and slants. After incubation for twenty-four hours, cultures are made from each colony, and identification of the organisms accomplished by staining, microscopic examination, and biochemical reactions.

Results of Bacteriological Examinations

By referring to table I, it will be noted that 146 spleens from puppies three to five months old were examined. Twenty-two (15.06 per cent) of these yielded three separate and distinct organisms. *Salmonella enteritidis* was isolated from 20 of the 22

TABLE I—*Bacteriology of spleens taken from distemper-infected puppies, adult dogs, and ferrets.*

SOURCE OF SPLEENS	SPLEENS EXAMINED	SPLEENS "STERILE"		SPLEENS YIELDING ORGANISMS		IDENTITY OF ORGANISMS	SPLEENS
		No.	%	No.	%		
Puppies (3-5 mos. old)	146	124	84.94	22	15.06	*Salmonella enteritidis*	20
						Micrococcus (unknown)	1
						Staphylococcus albus	1
Adult Dogs (2-5 yrs. old)	13	11	84.61	2	15.39	*Salmonella enteritidis*	2
Ferrets	21	21	100.00	0	0.0		

spleens, an unknown micrococcus from one spleen, and *Staphylococcus albus* from the remaining one.

In the case of the bacteriological examination of 13 spleens taken from adult dogs, two to five years of age, only two yielded results. In both instances, *S. enteritidis* was isolated. Dogs of this age are used solely in our work for the production of anti-canine distemper serum. It is interesting to note that during the hyperimmunizing process, approximately 10 per cent of them develop distemper.

Table I further discloses that none of the 21 ferret spleens examined during this work yielded organisms. Although this report includes a bacteriological examination of but 21 ferret spleens, we have had occasion from time to time to make a more thorough examination of these test animals. In these cases, not only the spleen, but other vital organs were included in the work. The results always have indicated that the ferret is not susceptible to the usual complications seen in dog distemper.

The culture isolated from the 20 puppy and two adult dog spleens were Gram-negative bacilli, about 1 to 1.5 microns in length, occurring singly and were motile. They were Endo-negative and fermented Krumwiede's triple-sugar agar with the production of both acid and gas in the butt, with the slant unchanged. This immediately placed the cultures in the Salmonella group of organisms. Further fermentation tests disclosed the ability of the cultures to produce both acid and gas in mannitol, another characteristic of the Salmonella group. Dextrin was not fermented. This eliminated the paratyphoids. Finally, both acid

and gas were produced in sorbitol (sorbite), which reactions are characteristic of *S. enteritidis*. This organism could not have been mistaken for *A. bronchisepticus*, as the latter characteristically fails to ferment any of the carbohydrates.

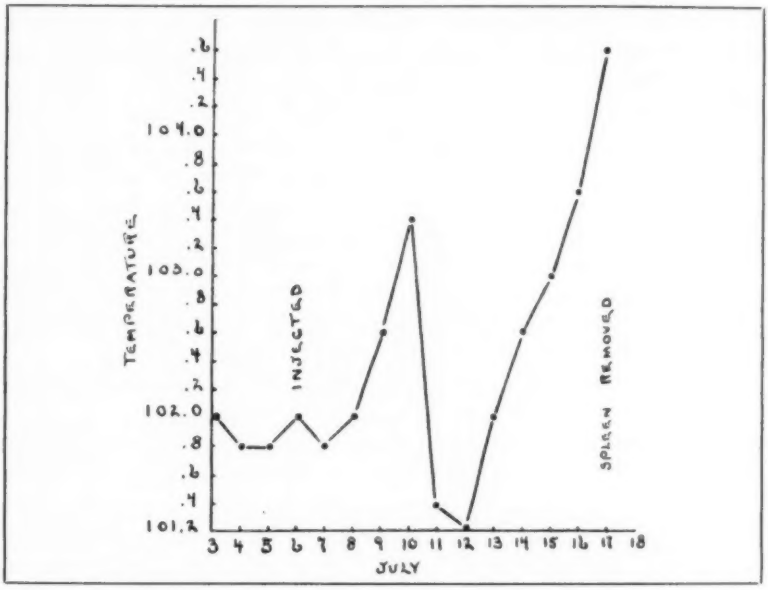

FIG. 1. Clinical chart showing typical diphasic rise in temperature in puppy following a 3-cc intramuscular injection of a 20 per cent suspension of "sterile" spleens taken from distemper-infected puppies and ferrets. This is characteristic of the uncomplicated or filtrable virus stage of the disease.

PRODUCTION OF DISTEMPER WITH "STERILE" SPLEENS

An intramuscular injection, consisting of from three to five cc of 20 per cent suspension of infected spleen tissue, is used consistently to produce distemper in our kennels. In some cases, however, natural infection is depended upon. The spleens used for this purpose are always proved to be bacteriologically sterile before being used in suspension form.

It is our custom to inject puppies in groups of twelve to fifteen. In no instance have we failed to produce distemper in at least 75 per cent of the group with such injections. This indicates that such "sterile" spleens contain the filtrable virus of the disease.

Figure 1 shows a typical temperature curve of an individual in one of these groups. The injections used in this group consisted of a suspension, 20 per cent in strength, made from a

combination of five puppy and three ferret spleens, all of which were "sterile." It is noted that the pre-injection temperatures were from 101.8 to 102.0° F. On the fourth day after injection, the temperature rose to 103.4° F., and within the next 48 hours had descended to 101.2° F. From this point, during the next five days, it gradually rose until it reached 104.6° F., at which time there appeared the usual eye and nasal lesions. As is our custom, the spleen was removed at this point in the course of the disease, before the stage of secondary invasion had advanced.

While this paper contains no data which conclusively prove that a filtrable virus was the infective agent in the spleen tissue suspension, it is shown that the dog's illness, represented by the temperature chart in figure 1, was not due to a visible, cultivable microörganism. However, we have been able in the past to filter these spleen suspensions through Seitz filters (E. K. pads) and produce a typical distemper syndrome in ferrets by subcutaneous injection with the "sterile" filtrate.

Several factors must be borne in mind if the demonstration of the filtrable virus is to be successful. The suspension of spleen tissue which is to be filtered should contain a heavy concentration of virus. This can be obtained only by removing the spleen from the ferret or puppy at the right time and by using it soon after it has been taken from the animal. Furthermore, it is quite important that the suspension is not given a preliminary filtration through infusorial earth, kieselguhr, or similar substances which adsorb the virus, leaving a negligible quantity, if any at all, to pass through the filter proper. The filter pads, Mandler or Berkefeld filters, themselves, adsorb sufficient of the virus to complicate the end results. Furthermore, it is quite necessary to inject the filtrate immediately into the test animals and not wait for the results of a sterility test. The filtrable virus of canine distemper readily becomes attenuated, if not avirulent, when held in suspension. The less the concentration of virus, the more rapidly does this attentuation take place.

Pathogenicity of Bacterial Invaders

Six of the 22 strains of *S. enteritidis* isolated from the spleens of distemper-infected puppies and adult dogs were selected at random and injected into 12 puppies and six ferrets for the purpose of comparing the symptoms that might result therefrom with those produced in puppies following their injection with suspension of "sterile" spleens taken from distemper-infected puppies and ferrets.

The injections were prepared from 24-hour agar slants by suspending the bacterial growth in sufficient physiological saline solution to make an approximate concentration of 2,000 million bacteria per cc. Two puppies and one ferret were injected with each strain in doses of 1 cc and 0.5 cc respectively.

Figure 2 shows the course of the *S. enteritidis* infection and the attending temperature curve in one puppy, which was typical

FIG. 2. Clinical chart of puppy showing temperature curve and symptoms following the subcutaneous injection of *Salmonella enteritidis* which was isolated from distemper-infected spleens. The results bear no resemblance to those produced by a suspension of "sterile" spleens (fig. 1).

of the group as a whole. It is noted that it bears no resemblance to the curve produced by the "sterile" spleen suspension. The pre-injection temperatures averaged about 101.8° F. The injection was made July 10 and within the subsequent 48 hours the temperature rose to 103.6° F. On the third day after the injection, a large abscess developed at the point of injection. This broke on July 17, four days after its appearance, when the temperature had reached its peak of 104.6° F. The temperature then gradually declined, but still remained above normal, the dog succumbing to a generalized infection on July 27, or 17 days after being injected.

The remaining eleven puppies in the group all showed similar clinical symptoms. Death occurred in two instances as early as seven days after the injection; in other cases as late as 18, 19,

23 and 24 days after injection. Only two of the puppies fully recovered.

During the course of the disturbance there were inappetence, lethargy, etc., but no characteristic symptoms of distemper, such as a muco-purulent conjunctivitis and rhinitis, emaciation, etc. Upon autopsy, there were noted: some lung congestion, but no consolidation or approach towards hepatization; an apparent albuminous degeneration of the liver, an interstitial nephritis, a slight catarrhal enteritis with a few ecchymotic areas on the intestinal mucosa, and a rather pronounced congestion of the splenic pulp with some enlargement of the organ. *S. enteritidis* was recovered from the heart-blood and spleen in every case.

All six of the ferrets developed large abscesses at the point of injection. After they broke and drained, the malaise of the animals disappeared and they all fully recovered, no deaths occurring in this group.

Discussion

It is apparent that the failure to isolate *A. bronchisepticus* from the spleens of distemper-infected dogs in the cases reported here was due to the fact that this organ was removed from the dogs during the uncomplicated or filtrable-virus stage of the disease; in other words, before the period of secondary bacterial invasion had set in. Had the operation been delayed a few days, the results might have been different.

While it has been shown by several workers that *A. bronchisepticus* can produce a distemper-like disease, indicating that the infection is produced by this pathogen alone, other evidence warrants the assumption that it is secondary to a preliminary debilitating filtrable-virus stage. Repeated efforts have demonstrated that it is impossible to immunize against true distemper with antigens composed of this and associated secondary invaders. On the other hand, there are abundant data available to show that a complete and durable immunity can be obtained by immunizing against this complex entity with products composed of the primary invader—a filtrable virus.

It has been intimated that the filtrable-virus infection with which we are dealing in this country is an experimental distemper, and, if such virus actually exists within our confines, it was introduced from England subsequent to the advent of the Laidlaw-Dunkin work. If such be the case, it is of country-wide distribution and has crossed our borders into Canada, Mexico, and Central American countries. The numerous strains of the virus, with which we have been working, are all of American

origin and have been taken from natural cases which appeared in the field.

SUMMARY

A bacteriological examination of 146 spleens, taken from distemper-infected puppies late in the filtrable-virus stage of the disease, at a time when the second rise in temperature reached a high level simultaneously with the appearance of the characteristic distemper conjunctivitis and rhinitis, resulted in the isolation of *Salmonella enteritidis* from 20 spleens, and an unknown micrococcus and *Staphylococcus albus* from one spleen each. The remaining 124 spleens were bacteriologically sterile. A similar examination of 13 spleens from distemper-infected adult dogs showed two of them to contain *S. enteritidis*, while 21 spleens from distemper-infected ferrets all proved to be "sterile."

In no instance was *Alcaligenes bronchisepticus* isolated from any of 180 spleens examined.

Suspensions of the "sterile" puppy and ferret spleens injected into puppies produced a typical canine distemper diphasic rise in temperature with characteristic attending clinical symptoms. These results, associated with the ability to pass the infective agent through Seitz filters, indicated that a filtrable virus was the etiological agent.

Subcutaneous injections of *S. enteritidis* proved to be pathogenic for a group of 12 puppies. All cases developed large abscesses at the point of injection. Ten of the 12 test animals succumbed to the infection at intervals of seven to 24 days after the injection. Autopsies showed evidences of septicemia and the organism was recovered from the heart-blood and spleen tissues. The temperature curves and clinical symptoms bore no resemblance to distemper.

Injections of this organism into six ferrets produced local abscesses, but did not prove fatal to any one of the group.

DISCUSSION

DR. E. A. CAHILL: It seems to me the two schools of thought have been very ably represented here this morning. However, I am cognizant of the fact that these proceedings will be read, as they always are, by many who are not present. I am also aware of the fact that practitioners reading the records of our meetings are frequently confused regarding the practical interpretation. I notice it every day. I want to inject a thought, not so much for those who are present, as for those who are going to read the record of today's session. Regardless of whether the filtrable virus is the primary cause and *Bacillus bronchisepticus* a secondary invader, or *vice versa*, without taking part in that phase of the discussion, there is increasing evidence through-

out the country of a very great need on the part of the practitioner for something besides the regular treatment for canine distemper. There is an increasing need and demand on the part of the practitioner for an anti-bronchisepticus serum to take care of secondary invasions in the cases they are called upon to treat. There is increasing evidence that the anti-bronchisepticus serum and the anti-filtrable-virus serum are not always one hundred per cent successful, unless the treatment is combined with other immunizing agents.

I am merely injecting that in the records, so that the practitioner reading this discussion will not be confused.

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ALLERGIC REACTIONS IN DOGS*

By P. W. BURNS, *College Station, Tex.*
Texas Agricultural and Mechanical College

Since von Pirquet,[1] in 1907, suggested the term "allergy" to designate certain specific hypersensitive phenomena, the term has become increasingly popular in the medical field as a general designation for a variety of manifestations. Allergy, anaphylaxis, specific hypersensitiveness, and idiosyncrasy are in part related and have been used somewhat synonymously to some extent, clinically at least, although there has been considerable effort during the past few years to clarify the differences. Vaughan[2] has expressed the difference between anaphylaxis and allergy in simple terms by stating that anaphylaxis is the more explosive type and allergy the milder and clinical form of reaction. The use of these synonyms in a loose sense may give us a fairly good conception of the scope of allergy.

It was with the purpose of determining if possible whether the widely used routine clinical tests for allergy, as applied to the human being, might find some application to the dog, and with the hope that some of the difficulties in diagnosing the various "skin troubles" which we encounter in that animal might be cleared up, that we undertook this study. We confined our work to the investigation of the reactions of dogs to a number of representative foods, and this paper might well be entitled, "Food Allergy in Dogs."

We selected 21 widely used foods from cereals, vegetables, and meat or animal foods in the form of powdered extracts.

Those used were:

Cereals	*Vegetables*	*Meat or Animal Foods*
Buckwheat	Lettuce	Beef
Corn	Sweet Potato	Pork
Oats	Spinach	Mutton
Barley	Potato	Salmon
Wheat	Carrot	Chicken
Rice	Cabbage	Milk
	Tomato	Egg
	Pea	

These powdered extracts may be obtained from a number of large drug supply firms.

The procedure on the first 25 dogs was the use of the scratch or cutaneous test, followed in two or three days with the more sensitive intradermal method as a check. In all animals the test

*Presented at the seventieth annual meeting of the American Veterinary Medical Association, Chicago, Ill., August 14-18, 1933.

area was washed thoroughly with soap and water, then dried and followed by an application of alcohol. The scratch test involves the making of a small scratch into the skin, not deep enough to draw blood, and then applying the allergen or food extract on the end of a sterile toothpick to the scratch which has been moistened with a drop of normal saline solution or N/10 sodium hydroxid.[3] The allergen was rubbed into the skin with the use of the toothpick. The site used for all of the testing was the ventral portion of the abdominal wall. It seems that the scratch test is used rather generally on the human being preceding the intradermal injection as a precaution to avoid the severe reactions that are experienced in occasional hypersensitive individuals following the latter method. In making the preliminary

FIG. 1. Dog 1 (8-3-33). Intradermal reactions one hour following injections of 1:100 and 1:250 dilutions of allergens in glycerin-saline medium. A (control), glycerin-saline diluent; B, rice (1:100 dilution); C, rice (1:250 dilution); D, lettuce (1:100 dilution); E, lettuce (1:250 dilution).

scratch tests we were merely feeling our way and trying to avoid such reactions.

After having tested 25 animals with the cutaneous method, and getting no more than several very mild and questionable reactions, which we were unable to check with the intradermal method, we discontinued the scratch tests and used the intradermal only.

We used the intradermal test on 65 dogs, although the extracts for the first 26 were somewhat different, which will be explained later.

The site chosen for the injections was the skin along the posterior ventral surface of the abdominal wall and the medial

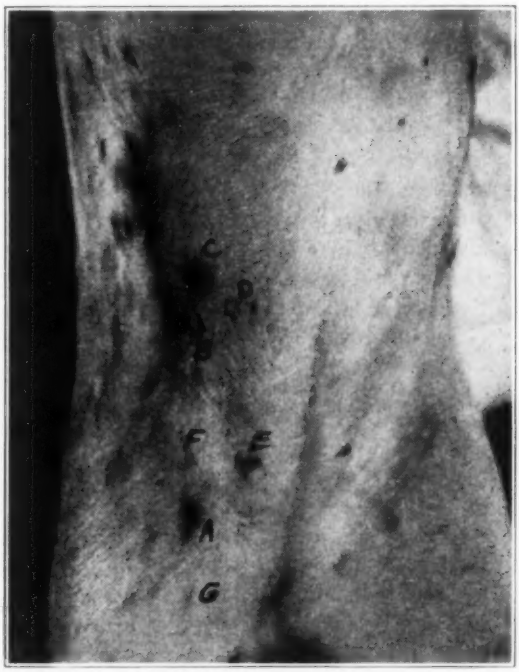

FIG. 2. Dog 1 (7-30-33). Intradermal reactions 24 hours following injections of allergens diluted in normal saline and glycerin-saline solutions. A, lettuce in normal saline; B, lettuce in glycerin-saline (1:100); C, lettuce in glycerin-saline (1:250); D (control), glycerin-saline diluent; E, rice in glycerin-saline (1:100); F, rice in glycerin-saline (1:250); G, rice in normal saline. (The control for the normal saline has diminished in size and color to such an extent that it is not apparent in the photograph.)

surface of each thigh. On most of the dogs tested this area was more or less bare and very suitable for the injections. In some dogs, particularly German shepherds, there may be a few hairs in this region, but there were never enough to necessitate clipping.

We placed the injections from one to two inches apart and preferably arranged in rows so as to facilitate reading. Two rows of five to eight or more injections can be made on each side of the median line by beginning at the medial surface of the stifle-joint and proceeding forward as far as the lack of hair will permit. Much is to be gained in time and accuracy from the sketching of the area and the location of each test, especially in those animals with a papular dermatitis, in order to avoid confusion in reading the tests. We made observations at one-half to one hour and at 18 to 24 hours. A positive reaction is evidenced by a wheal, which may or may not be accompanied by hyperemia or erythema. In a positive reaction in the human being considerable importance seems to be attached by some investigators or clinicians to the presence of pseudopods which radiate from the wheal.[4] We observed only one reactor in which there was an indication of an irregular or pseudopod-like border. In order to be as uniform as possible in the recording of reactors we modified the broad classification suggested by Coca[4] and used the following means of designation:

— Negative reaction, which remains about the same as the control.
+ + + Markedly positive reaction. There is a considerable increase in the size of the original papule (test) and an urticarial wheal is developed.
+ + Moderately positive reaction.
+ Slightly positive reaction.

For the first 26 dogs just enough powdered allergen to be held on the tip of a sterile toothpick was suspended in normal saline solution and was injected in .01- to .02-cc quantities at a single dose as used in the injection of tuberculin. A 25-gauge needle and a 1.0- or 1.5-cc glass hypodermic syringe, preferably the former, was used. Schnelle[5] reports the use of a different intradermal technic.

The positive results of the intradermal testing of the first 26 animals are shown in table I, the foods to which no reactions were obtained being omitted. Dogs in which there were no positive reactions are not included in the table.

We found that five of the six positive dogs reacted to lettuce. These reactions were of a delayed type, showing a marked hyperemic spot 0.5 to 1.5 cm in diameter, appearing more pronounced

TABLE I—*Positive results obtained in first series of dogs.*

Dog	Food			
	Chicken	Lettuce	Rice	Tomato
1	−	++	+++	−
4	++	+++	−	−
9	−	−	−	+++
12	−	++	++	−
24	−	+++	−	−
25	−	+++	−	−

at 18 to 24 hours and in most cases being negative until about three to six hours after injection.

The diluting fluid is Stier's modification of Clock's solution, consisting of 46 parts of glycerine and 54 parts of a 7 per cent solution of sodium chlorid. The advantage of using a strong glycerin-saline diluting fluid is in the keeping qualities of the allergens, which will resist deterioration for six months or more at room temperature. We used a dilution of one part of allergen to 250 parts of this medium to check dogs 1, 12, 24 and 25, which were good reactors to lettuce with the use of the previously described normal saline diluting method. With the glycerin-saline method we found that only dog 1 would react to lettuce. We continued this dilution on 39 additional dogs and found it to be much more satisfactory than the previously used procedure, because of the time saved and of the greater uniformity.

The positive results of the intradermal tests with the glycerin-saline solution method on 43 dogs are shown in table II. Animals not showing a reaction and foods to which there were no "positives" are not tabulated.

TABLE II—*Positive results obtained in second series of dogs.*

Dog	Food Extract								
	Chicken	Egg	Lettuce	Milk	Rice	Salmon	Spinach	Tomato	Wheat
1	−	−	++	−	+++	−	−	−	−
9	−	−	−	−	−	−	−	+++	−
33	−	−	−	−	−	−	+++	−	−
42	−	++	++	+	−	+	−	−	+
55	+	−	−	−	−	−	−	−	−
58	−	−	−	−	−	−	−	++	−
59	−	−	−	+	−	−	−	−	−

Feeding Tests

In order to determine if and how our intradermal "positives" would react to the specific foods to which each was found positive, we tried a series of feeding tests in those dogs which were available. These tests are outlined as follows:

Dog 1: Black and white smooth fox terrier, female. Reacted to rice + + + and lettuce + + . Apparently normal on physical examination.

Results of lettuce feeding: Five tests with both raw and cooked lettuce were made, the amounts fed varying from 170 to 258 gm each meal. No clinical disturbance was noted at any time.

Results of rice feeding tests:

April 25: Fed rice and ground cooked beef. Vomited.

May 2: Fed rice and ground cooked beef. Diarrhea noted the following morning. No apparent skin reactions. This dog had been under daily observation since March 1 and during this period had never been affected with diarrhea until the day following the rice meal. Recovered from diarrhea by May 5.

June 16: Fed 389 gm rice (cooked weight) mixed with a small amount of raw hamburger meat. Stools very soft next morning. Reaction not so marked as that of May 2.

June 25: Fed 75 gm rice (dry weight or 370 gm cooked). Vomited. Dog 9 was used as a control and was given 600 gm (cooked weight). No untoward results noted.

July 11: Fed 50 gm rice (dry weight or 320 gm cooked) mixed with 150 gm raw hamburger meat. No results noted.

July 17: Fed 60 gm rice (dry weight) mixed with 125 gm raw hamburger meat. No results noted.

July 24: Fed rice (75 gm dry weight or 513 gm cooked). No apparent results.

July 27: Fed rice (100 gm dry weight or 640 gm cooked) mixed with 100 gm cooked beef. No results noted the following day. Slight circumscribed dermatitis noted in left flank on July 29. Dermatitis had practically disappeared without treatment by July 30. Clipped on July 25 to facilitate skin examination.

August 4: Fed rice (125 gm dry weight or 839 gm cooked) mixed with 125 gm raw hamburger meat. Ate 727 gm of the mixture or 633 gm rice (cooked weight), or approximately 95 gm dry weight. No untoward results noted the following morning. Circumscribed dermatitis noted in opposite flank on afternoon of August 5, and was more pronounced on morning of August 6. No dermatitis noted on August 8.

Discussion: It is noted that after three gastro-intestinal disturbances following the feeding of rice no further results of this type were observed. The frequent feeding of the suspected food may have desensitized the animal, although the amounts fed seem rather large compared to those which have been used in the human being for oral desensitization. Rowe[6] quotes a number of successful oral desensitizations of the human being to certain

foods by beginning with very small amounts and gradually increasing the dosage.

LaRoche and Fils[7] also report the immunization by Finizio of human beings to milk by this method.

The skin manifestation which appeared within 36 to 48 hours after ingestion in two feeding tests may have appeared on preceding tests but was not recognized because of the thick hair coat.

Dog 9: Grade German Shepherd, female. Reacted to tomatoes + + +.
June 14: Given a No. 2 can (1 lb. 3 oz. net) of tomatoes mixed with a small amount of cooked beef at 1 p. m. Conjunctivitis noted at 1:30, but had disappeared by 3 p. m. The following day an urticaria was observed in the right flank where there had been a small area of dermatitis at the time of feeding.
June 16: Fed a No. 2 can of tomatoes at 12:30 p. m. Slight conjunctivitis appeared at 3 p. m. and had disappeared by 5 p. m.
August 1: Fed a No. 2 can of tomatoes. No apparent results.
August 3: Fed a No. 2 can of tomatoes at 9 a. m. Circumscribed dermatitis noted on abdominal wall and around one elbow that afternoon or about eight hours after feeding. Dermatitis had improved considerably by August 5, and had practically disappeared by August 7.
Dog 58: Grade German Shepherd, female pup, born July 1, 1933. Reacted to tomatoes + +. Dog 9, dam of pup 58, had received a No. 2 can of tomatoes on June 16 during gestation.
August 1: One hour after feeding a No. 2 can of tomatoes to dog 9, dog 58 was allowed to nurse to study the possibility of the allergen being in the milk. No apparent results.
August 3: Allowed to eat tomatoes with dog 9. No apparent results.

Discussion: Dog 58, one of a litter of four, was the only one to react to the intradermal test for tomato, and this was the only allergen to which any reaction was given by any of the four. We were unable to support the intradermal reaction with any apparent untoward reaction to the feeding test. Although the value of the intradermal reaction is diminished because of the apparent failure with the feeding test, it is of interest to note that dog 9, the dam, was also a reactor to tomato. Reports have been made of the hereditary tendency to allergic conditions.[8]

Dog 12: Spitz, female. Rice + +.
June 16: Fed 100 gm rice (cooked weight) mixed with raw hamburger meat at 12:30 p. m. Nothing noted except abnormal softness of stools next morning.
June 20: Fed 100 gm rice (cooked weight) mixed with raw hamburger meat. No apparent results.
Dog 33: Black mongrel, female pup about 6 months old. Reacted + + + to spinach.
August 3: Fed 222 gm canned spinach mixed with 135 gm raw meat. No results noted.
August 4: Fed 309 gm canned spinach mixed with 150 gm cooked beef. No apparent results.

Discussion: Of the five animals tested with the different diets, three reacted with various symptoms. The skin and gastro-

intestinal reactions were the most prominent. Without doubt, considerably more value should be placed on feeding tests than skin-testing, although the intradermal test is of value as an adjunct to the feeding tests. It should be comparatively easy to use elimination diets on dogs, both as a means of diagnosis and for treatment. Diet trials in the human being are used to a considerable extent and in some cases are being used extensively in diagnosis. We feel that some of those obscure and difficult cases of skin disturbances in the dog possibly may be cleared up if more attention is given to allergy.

SUMMARY

1. An intradermal method of testing dogs for food allergy with the use of a 1:250 dilution of the food extract in a glycerin-saline medium is presented.

2. Several clinical cases of reactors to certain foods and the symptoms of each have been outlined.

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Something New in Prosecutions for Cruelty

That thirteen sheep were cruelly terrified when several of their fellows were slaughtered before their eyes, was the contention of the Royal Society for the Prevention of Cruelty to Animals when it brought suit against Messrs. O'Neill, Ltd., victuallers, of Dublin, Ireland, recently.

According to the testimony of Prof. J. F. Craig, principal of the Veterinary College of Ireland, there was no cruelty, as one sheep seeing another slaughtered was incapable of reasoning that it would itself next suffer a similar operation. The sheep, he said, was one of the least intelligent of domestic animals.

The summons was dismissed upon the payment of costs, says the *Veterinary Record* in reporting the case.

What is now proved was once only imagined—WILLIAM BLAKE.

SOME PROBLEMS IN POULTRY NUTRITION*

By H. L. WILCKE, *Ames, Iowa*
Iowa State College

I do not wish to appear to be a propagandist right at the beginning, but I believe that a few figures concerning the poultry industry would not be out of place since comparatively few people realize the magnitude that this industry has attained. In 1932, the total value of poultry and poultry products was $608,000,000, ranking third in value of all crops produced in the United States, exceeded in value only by dairy products and by hogs. In 1929 and 1930, the value of poultry and poultry products exceeded $1,000,000,000.

When the value of the unit, that is, a dozen eggs or the individual chicken, is considered, one may acquire some conception of the vast number of hens required to produce the eggs (over 2,000,000,000 dozen in 1930), and the much larger number of young stock that must be raised each year for meat and to replace the hens which are removed either by culling or by mortality (546,000,000 chickens produced in 1925). In the poultry industry, and I believe the same statement may be made concerning any other class of live stock, as the numbers increase, the requirements of management, of nutrition and of breeding become more exacting.

Often the knowledge of these factors has not kept pace with the increasing population, and breakdowns are inevitable. Some of the problems of nutrition which seem to require some adjustment to present poultry conditions should be of interest to this group.

Problems in nutrition may be divided into three groups: first, those concerning protein; second, those concerning the inorganic elements or minerals and, third, the problems dealing with the vitamins. The problem of the proper and most efficient utilization of protein supplements seems to be a perennial one. In common practice chicks are fed from 15 to 20 per cent of crude protein in all-mash starting rations. The all-mash system of feeding chicks is probably by far the most common method used at the present time. The young chick requires a higher level of protein in the ration for the first six weeks than it does thereafter. Its proportionate gains in weight are greater during this period than in any other period in its development. The question that

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seems to be most in dispute at the present time is whether the amount of protein in the ration should be continued throughout the growing period or if it should be reduced. The practice of cutting down the protein in the growing ration in order to delay the time when the first egg is laid has been almost universal among poultrymen, but during the past few years there has been an accumulation of evidence showing that the rate of sexual maturity of pullets can be influenced only to a very small degree by feeding.

The time the first egg is produced apparently can not be hastened or retarded more than a few weeks by varying the amount of protein in the feed. The protein usually is the most expensive item of the feed and for that reason the level of protein to be used is governed not only by the rapidity of growth of the chicks, but also by the economy of the gain and by the viability and the later production of the birds. If the protein fed is inadequate in either kind or amount, the growth of the chicks is stunted and the mortality increases with the degree of deficiency. If too much protein is fed, the chicks may develop pathological lesions, such as deposits of urates, chiefly in the ureters and kidneys, but also in other organs.

I have been speaking of the quantity of protein to be used without referring to the quality, which is equally as important as quantity, if not more so. Milk proteins, supplied in any form, are the most satisfactory for the majority of poultrymen but the cost of milk products prohibits the exclusive use of this source of protein. Fish meals are highly digestible and are used widely along the sea coasts, but not so extensively inland, partly because of the cost of transportation and partly because of fear of rancidity in hot weather. Meat scraps and meat and bone meal are used widely and both products are very good sources of protein for chickens. Meat scrap is a product containing less than 22 per cent of tri-calcium phosphate, while the product containing more than that amount is designated as meat and bone meal. Tankage is not so desirable as meat and bone meal because it seems to vary more in quality and composition, and it is desirable that the product used be as uniform as possible.

Various forms of vegetable protein also are used, but in the light of present knowledge, they should be used only in conjunction with some form of animal protein. It has been demonstrated[2] that a ration containing up to 25 per cent of a vegetable protein concentrate produced no better results than when no protein supplement at all was added to the laying mash. Somewhat

better results have been obtained by the use of mineral mixtures with the various vegetable protein supplements, such as soybean oil meal, linseed oil meal, corn gluten meal, peanut meal, and so on. These supplements have not been found satisfactory, when fed as the sole source of protein, for either growth or egg production. They may be used very satisfactorily and economically to replace a part of the animal protein concentrate.

Investigators seem to be very well agreed that the maximum growth for the first six to eight weeks may be obtained by feeding 20 per cent of protein, supplied chiefly by meat products. However, when the sole source of animal protein is dried milk, a level of 15 per cent[3] seems to produce results which are fully as satisfactory as those obtained with higher levels, when the chicks are carried to maturity and egg production is considered. Fifteen per cent or less of protein in the mash seems to meet the requirements of the growing chicks after the first 6 to 8 weeks period. It would seem, then, that an all-mash ration, containing 15 to 16 per cent of protein, would yield the most economical results for birds that are to be kept for egg production, whereas higher levels of protein may be used for broiler production.

Slipped Tendons

The inorganic constituents of the ration have received much attention during the past few years, due principally to the appearance of a disorder known as slipped tendons, hock disease, perosis, and by various other names. No doubt most of you are familiar with this disorder. It has some symptoms in common with rachitis, such as an early deformity of the breast bone, and bending or bowing of the legs. The abnormality in slipped tendons seems to be centered about the hock joint, which, in chickens, is the tibio-metatarsal joint. According to Kaupp,[4] the tarsus does not develop in chicks, but fuses with the tibia and metatarsus in the embryonic stage. The distal end of the tibia articulates with the proximal end of the metatarsus, and has two condyles separated by an intercondyloid space. In some cases of the condition known as slipped tendons, the tendons which glide between these condyles are displaced, and it is from this that the name "slipped tendon" has been derived. However, this does not occur in all cases, and the name is not entirely appropriate, as is the case with so many popular names.

Rachitis

There are certain differences between this condition and rachitis, which has been defined by Park[5] as "a disturbance in

the metabolism of the growing organism of such a nature that the salt equilibrium, in particular as regards calcium and phosphorus, in the circulating fluids is disturbed, and lime salts no longer deposit in the bones." He states also that "the first detectable signs of rickets are probably a diminution of the inorganic phosphorus of the blood." This definition is better suited to the work of the chemist, but the one given by Glisson, as quoted in Dorland,[6] although fundamentally the same, is probably better suited to the needs of the clinician: "A constitutional disease of infancy in which the bones become soft and flexible from retarded ossification, due to deficiency of calcium salts." This disease most commonly appears in chicks between the fourth and the eighth weeks, but it may develop somewhat earlier or later. Rachitis frequently appears in laying flocks that are receiving no vitamin D supplement, especially if the production is good, and when it occurs in mature birds it is often confused with other forms of paralysis.

The first symptoms noted in chicks are usually a crooked breast bone and a tendency to sit around with apparently no desire to walk. The feathers become ruffled, and the bird may lose weight. A lame, stilty gait is developed and the legs begin to bow or bend inward. Knobs form at the cartilaginous junctions of the ribs and the bones become soft and may be bent readily without breaking. Vitamin D may be supplied in the form of cod-liver oil, sardine oil, or the various other fish oils or their concentrates, in the form of ultra-violet light, by other vitamin-D supplements, and last and the most economical of all, by direct sunlight. Vitamin D furnished in any of these forms in sufficient amounts ordinarily will cure rachitis in the presence of an adequate, yet not overadequate, supply of calcium and phosphorus in the ration. This is not true of slipped tendons.

An adequate supply of vitamin D administered in the form of ultra-violet light, direct sunlight, or from one to two per cent of vitamin-D-potent cod-liver oil, will neither prevent nor cure this deformity. Contrary to the conditions found in cases of rachitis, the bone ash and the plasma calcium and inorganic phosphorus of chicks affected with slipped tendons are all well above the minimum level accepted as normal. This holds true throughout the period in which slipped tendons develop, which is ordinarily from two weeks to twelve weeks of age, although we have observed a typical case in a 20-day embryo, and also in chicks immediately after hatching.

Calcium-Phosphorus Balance

These are some of the differences between rachitis and slipped tendons. There are, nevertheless, striking similarities between the two conditions. Both are believed to be caused by improper amounts or ratios of calcium and phosphorus in the diet, which, as I have said, usually is corrected sufficiently by vitamin D to avoid true rachitis, but an excessive amount of phosphorus in the ration is believed to be one of the causative factors of slipped tendons, which cannot be corrected by vitamin D. However, when the amount of calcium and phosphorus in the diet is cut down too low, in an effort to avoid slipped tendons, rachitis has been found to develop in some instances, if low bone ash may be accepted as a diagnosis of rachitis. At the other extreme, when the total ash of the ration, and especially calcium and phosphorus, are increased beyond reasonable amounts, rachitis again develops in the presence of vitamin D. Thus we have, at either extreme, the development of rachitis, with normal growth and well-being just above the lower rachitic level, and slipped tendons between the normal and the upper rachitic level.

It has not been demonstrated conclusively that the calcium and the phosphorus in the ration are the only causative factors of slipped tendons. The amount of protein in the ration has been incriminated, yet a correlation between the two has not been demonstrated. Slipped tendons have been prevented at the Pennsylvania Station[7] by the addition of oats or oat feed to the ration, but this beneficial action could not be explained on the basis of the fibre content of the product. Titus and Ginn[8] have found that the addition of 7 to 10 per cent of rice bran to the ration, with a simultaneous adjustment of the calcium to phosphorus ratio to about 2.5:1, prevented slipped tendons. Rice bran hardly can be accepted as a specific for the prevention of this deformity on the basis of this work alone, because of the apparent necessity of changing another factor in the ration—the ratio of the calcium to the phosphorus.

These two abnormal conditions, rachitis and slipped tendons, seem to be the most obvious manifestations of improper amounts or ratios of calcium and phosphorus in the ration. Retarded growth also results from the use of excessive amounts of the compounds of these elements. The requirements of the growing chick for calcium have been described by Wilgus[9] as approaching a minimum level of 0.66 per cent, and for phosphorus as being 0.5 per cent or less of the ration.

Another element, magnesium, also is mentioned frequently in this connection. A deformed bone condition results when the ration contains excessive amounts of magnesium.[10] Whether this is the same type as slipped tendons seems to be a matter of some dispute, but there is a retarded rate of growth with a permanent deformity, nevertheless. Excessive amounts of magnesium in the diet, accompanied by comparatively high values of calcium and phosphorus, also appear to cause a rachitic condition, as judged by low bone ash.

Fluorin is another inorganic element which is not commonly a source of trouble in poultry rations except in those sections where rock phosphate is used as a phosphorus supplement in the diet. It has been shown recently by the Wisconsin Station[11] that 0.15 per cent of sodium fluorid did not appear to exert any unfavorable effect on the appearance or weight of the chicks, but 0.3 per cent of "sodium fluorid depressed the appetite and the weight of young chicks, but had little effect on chicks two and three months old. Sodium fluorid at a 1.2 per cent level proved markedly toxic to chicks of all ages." Since sodium fluorid is a fraction over 45 per cent fluorin, the fluorin content of the 0.15 per cent sodium fluorid ration would be about 0.068 per cent, that of the 0.3 per cent sodium fluorid ration would be 0.136, and that of the 1.2 per cent sodium fluorid ration would be 0.543.

The ingestion of 0.6 per cent and 1.2 per cent of sodium fluorid (0.271 and 0.543 per cent of fluorin respectively) apparently lowered the serum calcium of young chicks, but there was no evidence of any effect of sodium fluorid on the serum calcium or inorganic phosphorus of older birds. Sodium fluorid had no consistent effect on the bone ash, the kidney phosphatase, or either the size or the structure of the parathyroids. Small hemorrhages were observed in the duodenal loop of some of the fluorin fed chickens at all levels of fluorin intake. The ingestion of 0.96 per cent of sodium fluorid (0.43 per cent of fluorin) caused a decrease in the weight and in the egg production of hens.

Thus it can be seen from this work that it is necessary to reach relatively high levels of fluorin in the ration before any apparently harmful effects will be noted on the chicks and on the laying hen. Thus, one of the limitations in the use of rock phosphate as a substitute for bone meal may be determined readily by the fluorin content of the product.

The Vitamins

No discussion of problems in nutrition would be complete without a discussion of the vitamins. I have discussed vitamin D to some extent already, in connection with rachitis and slipped tendons and the calcium-phosphorus balance. In addition, there probably should be some mention of the effects of over-dosage of this vitamin. There is some difference in the relative efficiency of the various sources of vitamin D for poultry. Such concentrates as ergosterol, according to the majority of reports, are less efficient than cod-liver oil when fed on the same basis of vitamin-D content. For this reason, the number of units of D that should be fed varies with the antirachitic agent used. The reason for the difference in utilization of these products by the different species is another one of the problems that has as yet not been solved.

The amount of vitamin-D-containing substance to be fed requires more careful regulation than was at one time supposed. Overdoses or prolonged feeding of comparatively large quantities of vigantol or vitamin-D-potent substances produce loss of appetite followed by loss of weight, general ill-health and malnutrition, and death. There usually is a tendency toward hypercalcemia, often accompanied by low inorganic phosphorus values. Calcification of tissues seems to be one of the results of hypervitaminosis D in most mammals, but this has not been borne out with the chicken. Instead, Hall and King[12] hold the view that "the earliest changes in tissues, at least with chickens, is not calcification but a degeneration which may proceed to calcification, the latter not being the essential change."

The vitamin A required for maintenance by pullets weighing 3.2 pounds was estimated by Sherwood and Fraps[13] to be 105 units a day or 33 units per pound per day, as compared with 4 units per pound per day estimated to be required for the maintenance of growing rats. Of course, the production of the pullets may be a factor in the large maintenance requirements of these birds. It has not been determined whether the unit requirements of heavier birds would be the same as that of the lighter pullets used in this work. It was estimated also that each unit of vitamin A in the egg required 6.3 units in the feed in addition to the maintenance requirements. Yellow corn has been found[14] to vary from 2.5 to 8 (usually 5 to 7) units of vitamin A, depending upon the season and the locality in which the corn was grown. Alfalfa meal was found to contain from 3 to 12 units per grain. A mash containing 5 per cent of this alfalfa meal and 30 per cent

of yellow corn would supply approximately 147 rat units per bird per day at average food consumption and a scratch feed made up of 50 per cent yellow corn would furnish almost 200 units of vitamin A. It would be necessary, on this basis, to have at least these amounts of yellow corn and alfalfa meal in the ration in order adequately to meet the requirements of the birds for continued well-being and egg production. When these requirements are not met, as they often are not, egg production is decreased, body weight will decline, as a rule, and the birds will become more susceptible to infections in the respiratory tract. When the vitamin is lacking entirely, death results after varying lengths of time, from 30 days upward, depending upon the amount of vitamin A the individual had stored from previous feeding. If the vitamin-A content of corn and alfalfa meal used happened to be at the lower limit of A content mentioned, the ration would be inadequate, and it is therefore desirable that the ration always be supplemented with green feed or some other source of vitamin A such as cod-liver oil, the choice of supplements being determined to some extent by the relative price.

The vitamin-B complex has been divided by some workers into three parts, by some into four, and into still more by others. The first is known as B, B_1 or F, the second as G or B_2, and the third B_3, with the additional B_4 used by some workers. In this country the first is most commonly known as B, and this is the antineuritic factor necessary to prevent polyneuritis in birds and probably beri-beri in man. Complete absence of B results in loss of appetite, loss of weight, and nervousness, which may progress to complete paralysis of certain organs. It is found in wheat embryo, rice polishings, rice bran, cereal grains, yeast, grasses and leafy plants, and milk.

Vitamin G is the antipellagric factor which prevents the occurrence of a pellagra-like syndrome in chicks, which has been reported by Norris and associates,[15-16] Bethke and associates,[17] and by Ringrose and his associates.[18] Lesions of pellagrous character developed in the chicks when they were three weeks of age. These lesions develop at the eyes, at the corners of the mouth. and on the feet, the outer layers of skin on the feet and toes peeling off. Scabs may form at the corners of the mouth. In chicks 18 weeks of age, complete loss of feathers may occur in limited areas on the head and neck. This condition may be prevented by the feeding of liver or other glandular tissue, yeast, milk, or green leafy plants.

Vitamin C has been supposed to be unnecessary for chickens of any age until recently, when a report by Holst and Halbrook[19] indicated that growing chicks were subject to scurvy, the first external symptoms usually appearing about the third week. The symptoms described were nervousness and lameness, followed by bleeding from the pin feathers and the appearance of blood clots under the skin and in the muscles of the thigh, around the hock joint and at the base of the wings, generalized hemorrhages, brittle bones, dry and colorless bone-marrow, low hemoglobin, and erosions of the gizzard lining. These symptoms were produced by feeding a ration made up of fish meal, ground yellow corn, yeast, ground oyster shell and sardine oil or cod-liver oil to chicks confined in battery brooders. The omission of the yeast decreased the incidence of these symptoms, and "the substitution of 10 per cent of dried skim-milk for the yeast and a portion of the fish meal produced about normal chicks." The skim-milk did not prevent the gizzard erosions, but "five grams of cabbage per bird fed to affected individuals during the fifth and sixth weeks resulted in a complete recovery at the end of this period."

We have had occasion, at the Iowa Station, to attempt to find the rôle of nutrition in the prevention of so-called range paralysis.[20] Rations were used in which the effect of vitamins A, B and G, iodin supplements, and various amounts and ratios of calcium and phosphorus were studied. The only ration which appeared to affect the course of this disease was one which failed to produce satisfactory growth, and was discontinued at 12 weeks of age. There were fewer cases of range paralysis among these chicks than in any of the other groups which were similarly treated, with the exception of the ration. In our work, green feed in the form of clover, alfalfa, or rape has failed to influence the incidence or the course of this disease.

There are many other problems in poultry nutrition which are equally as important to poultrymen as some of those that I have mentioned, but I have attempted to limit this short discussion to those in which I thought the veterinarian would be most vitally concerned.

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Work first and then rest.—JOHN RUSKIN.

An Unscientific Incident Concerning a Scientist and a Scientific Society

The recent death of Dr. William H. Anthony, of Plainfield, N. J., brought to light a story of the finding of his Sigma Xi key which he lost several years ago. He was calling on a patient at Springdale at the time. On returning home he missed the key and despite diligent search never recovered it.

The day the local banks were closed by proclamation, Mrs. Anthony, through a chance meeting of Doctor Cushing* a veterinary surgeon, in the office of Dr. Julian P. Linke, learned of the finding of the key.

Dr. Cushing, who at the time did not know Dr. Anthony, told her he was called to a farmer's home near Springdale some time ago to attend a sick cow. He met George Stine, who was attracted to a pin he was wearing. He asked him what it was. After being told he said he had "one of them things."

Going to a cigar box hidden behind a mantelpiece in the house, he brought out a Sigma Xi key. Dr. Cushing found Dr. Anthony's name inscribed on it. Mr. Stine said he found it in the road near his home some time before.

Dr. Anthony received the emblem at the University of Pennsylvania in 1903.

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*Dr. E. R. Cushing (Corn. '20), Plainfield, N. J.

NICOTIN SULFATE AS A VERMIFUGE FOR THE REMOVAL OF ASCARIDS FROM POULTRY*

By WM. L. BLEECKER AND R. M. SMITH
College of Agriculture, University of Arkansas
Fayetteville, Ark.

The history of the use of tobacco and its derivative nicotin was covered very completely in a paper, presented at the 1930 meeting of the American Veterinary Medical Association, by Dr. C. D. Carpenter, of California,[1] so the subject will be but briefly summarized here. As a means of control for external parasites the use of tobacco came into use about 1890; in 1910, a 40 per cent solution of nicotin sulfate was developed by George B. Lindenberger and Robert B. Arnold and since then has been extensively used in the form of Black Leaf 40 for a parasiticide for plants and animals.

Herms and Beach, of the California Agricultural Experiment Station,[2] in 1916, reported work on the use of tobacco for the removal of round worms in poultry. Beach previously had tested the efficiency of powdered areca nut, powdered pomegranate root, turpentine, gasoline, iron sulfate and tobacco for the removal of internal parasites and had found tobacco the only one giving promise of being an effective agent for flock treatment.

The recommendations of Herms and Beach were as follows: The birds to be treated are fed one-half the usual evening ration on the day previous to treatment and receive no feed on the day of treatment until 2 p. m. They are then fed one-half the usual grain ration to which has been added one pound of finely chopped tobacco stems, for each 100 birds, that have been steeped for two hours in sufficient water to cover them, the stems and the liquid in which they had been steeped both being added.

Two hours later, one-fourth the usual grain ration was moistened with water in which Epsom salt at the rate of 11 ounces for each 100 birds had been dissolved. The treatment was to be repeated in seven days. The authors make this significant statement:

> When the medical mash is fed care should be taken to see that each bird gets its share.

However, they did not say how this could be accomplished. Hall and Foster,[3] in 1918, tried the tobacco treatment of Herms and Beach on six chickens that had been starved for 24 hours and

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found that they did not consume all of the medicated mash the first day, so fed the remainder the next day. They say this:

> A mixture of bran and tobacco was used and the birds were not very eager for it even after the preliminary fasting.

Unfortunately none of the fowls treated by Hall and Foster were harboring *Ascaris lineata*. As a result of the treatment, 30 (18.3 per cent) of 162 cecal worms (*Heterakis papillosa*) and three (7.7 per cent) of 39 tapeworms were removed. The authors assumed, and undoubtedly they were correct in doing so, that when *H. papillosa* were removed in considerable numbers, the treatment would have been effective against *A. lineata* had these parasites been present, and if the dose had been repeated as recommended. According to Carpenter,[1] the use of tobacco dust was introduced by a California poultryman whose results were confirmed by Dougherty and Beach, who recommended that 2 per cent of tobacco dust by weight should be added to the mash to be fed for a period of three to four weeks. Of this treatment Beach and Freeborn[4] say this:

> This was a distinct advance over the old infusion method but the unreliability of the nicotin content and the fact that many birds (some which needed it most) refused to eat the treated mash discouraged the use of this material and convinced us that an individual treatment was the proper solution of the problem.

Apparently Lamson[5] was the first to use Black Leaf 40 for internal medication. He used it in 1923 for the control of *Strongylus contortus* in sheep, and found it to be an effective vermicide for this purpose.

In the same year, Freeborn,[6] of the University of California, reported on work that had been in progress for one and one-half years at that institution, in which tobacco dust had been used as a vermifuge on hundreds of birds in which these conclusions were reached:

> That commercial tobacco dust containing from 1½ to 2 per cent of nicotin, if fed in the mash in a quantity of 2 per cent by weight, over a period of one month, would remove 98 to 100 per cent of *Ascaris lineata* and 80 to 85 per cent of *Heterakis papillosa*.

They found it necessary to add the tobacco dust at frequent intervals because of the volatility of the nicotin. Hall[3] says it is advisable to add only sufficient tobacco dust to the mash for feeding the current day.

Freeborn[6] also carried out extensive experiments with nicotin sulfate in the form of Black Leaf 40. Of the Black Leaf 40, when administered diluted with water, he says:

> Diluted nicotin sulfate administered to the birds in quantities sufficient to remove the worms is decidedly toxic. Mixed with the mash or drinking water renders them so distasteful that the birds will not eat properly.

He found, however, that by mixing the nicotin sulfate with Lloyd's reagent, which is a selected fuller's earth, he obtained perfect elimination of the intestinal worms. The specific action of the fuller's earth was not known, except that it has the power of protecting the treated bird from the toxic action of the nicotin yet liberating the nicotin in sufficient quantities to eliminate the worms. Carpenter[1] explains this action as follows:

> It is not definitely known how fuller's earth protects the bird, but it is a fact that the nicotin is absorbed and adsorbed and is undoubtedly released slowly enough that the birds are not seriously affected.

The formula Freeborn found to be the most satisfactory is as follows: 7.92 grams of Black Leaf 40 is mixed with 16 grams of Lloyd's alkaloidal reagent, and 350 to 400 milligrams of this mixture constituted a dose for an adult bird. This form of nicotin sulfate is prepared in individual capsules and these are marketed under the name of Pulvules No. 142 by the Eli Lilly Company.

Freeborn also found that nicotin sulfate in proper dilution could be used safely and effectively as a rectal injection for the removal of *H. papillosa*. Ten cc of a 0.5 per cent solution (1 cc Black Leaf 40 added to 200 cc of distilled water) removed approximately 85 per cent of these parasites, while 10 cc of a 1 per cent solution killed the birds in about ten minutes. This shows that the margin of safety, when nicotin sulfate is used in this manner, is not great.

Experimental work conducted for the purpose of determining the efficiency of various vermifuges for poultry has been in progress at the Arkansas Experiment Station for three years, in the course of which a number of remedies containing nicotin sulfate have been tested on a relatively large number of birds.

Among those vermifuges containing nicotin sulfate that have been tested are the following: Pulvules No. 142 (Lilly), prepared according to the formula of Dr. Freeborn, given simultaneously with a capsule containing 15 grains of kamala; nicotin-kamala, in the form of a "double duty" capsule, prepared by the Jensen-Salsbery Laboratories; Black Leaf 40, given simultaneously with a capsule containing 15 grains of kamala; Black Leaf 40 and 15 grains of kamala in the same capsule; Black Leaf Pellets, prepared by the Tobacco By-Products Corporation; and one or possibly two commercial vermifuges. We do not have the formula of one that was used.

Throughout the work practically the same procedure has been used. Birds from parasitized flocks, as far as possible, have been

purchased upon which to test the various vermifuges. A sufficient number were not always available and in a few cases cull birds from a poultry packing plant were purchased. However, these did not prove to be satisfactory. The birds were placed in individual pens, on half-inch hardware cloth over pans of water, in the evening, without being fed and were treated the next morning. In order that all of the parasites that were to be voided were passed, the birds were kept in the pens with only water before them for 48 hours and then autopsied. Upon autopsy the number and variety of the parasites in the intestine were determined and the number voided during the 48-hour period.

Had we been able to follow the suggestions of Schlingman,[7] of administering the ascaricide and the tenicide three days apart, our results might have been more definite. He found, in testing the efficiency of kamala as a tenicide and tetrachlorethylene as an ascaricide, that the efficiency of both was reduced when the two were given simultaneously, and recommended that three days be allowed to intervene between the administration of the two drugs.

None of the treatments for worm infestation that we have tried has any effect on the capillary worms, or on *H. papillosa*. Capillaria burrow into the mucous membrane and destroy the epithelial cells, resulting in a very intense inflammation, which is followed by the formation of a thick viscous exudate, which appears to protect them effectively from the drugs used.

Rietz[8] tested the efficiency of several drugs for the removal of Capillaria and found carbon tetrachlorid to be the only one to give promise of being effective. He and the writers used turpentine, but without success, in the removal of this parasite.

Because we found no vermifuge, when administered by way of the mouth, to be effective against either Capillaria or *H. papillosa*, we are considering birds harboring *only* one or both of these parasites to be free from *vulnerable* parasites and it is on this basis that the following results are based.

The results obtained in treating chickens with the various forms of nicotin sulfate, as noted above, were as follows:

1. *Pulvules No. 142 (Lilly):* This preparation was used on a total of 32 birds, with an average efficiency of 72.5 per cent. It was used alone in one group of six birds and combined with 15 grains of kamala to treat 26. From the lot of six birds receiving the capsule alone, 100 per cent of *A. lineata* were removed from three fowls harboring this parasite and all except one from the

other parasitized bird. In the other groups, consisting of 14, 6, and 6 birds respectively, the efficiency averaged 78.5, 57.0, and 50.0 per cent respectively, averaging 72.5 per cent for the 32 birds.

In our hands, therefore, and under our conditions, this vermifuge proved to be considerably less effective than Freeborn found it to be.

Black Leaf 40, in combination with 15 grains of kamala, was used to treat a total of 135 birds. When first used, the desired amount of Black Leaf 40 was mixed with water and administered to the individual bird by means of a funnel extended with a short length of rubber tubing, the material going in this manner directly to the crop. Later the desired amount was added to the capsule containing the kamala and the two administered in the same capsule.

Freeborn had reported that Black Leaf 40 was too toxic to be administered alone. However, we did not find it to be toxic when administered in proper dosage except to very badly depressed birds. Our results following the use of Black Leaf 40 are as follows:

In the fiscal year 1931-32, 83 birds were treated with Black Leaf 40 combined with 15 grains of kamala, the results of which were reported in a previous paper.[9] When administered in amounts ranging from 2.5 minims up to 0.3 cc, in combination with 15 grains of kamala to 30 birds, 100 per cent of the vulnerable parasites were removed. When administered in larger amounts, the efficiency did not appear to be so high and toxic symptoms, with death, were produced in one or two instances.

Additional work with Black Leaf 40 combined with 15 grains of kamala was continued during the fiscal year just closed. During this year it was used on 52 experiment birds in ten different groups, five drops of Black Leaf 40 combined with 15 grains of kamala comprising a dose for a bird with four exceptions. These were large cocks and each of these received 10 drops of Black Leaf 40 and 30 grains of kamala. None of these showed toxic symptoms.

Following is a short account of the results obtained in the use of Black Leaf 40 plus 15 grains of kamala in the treatment of the 52 birds noted above.

1. Group C: This group consisted of seven birds, two of which received double doses of the combined vermifuge. Three of these birds were found to have been harboring vulnerable parasites. All parasites were removed from one bird, 50 per cent of them

from one, and none were removed from the other. The average efficiency was 50 per cent.

2. Group D: Consisting of eleven birds, only four of which were found to have been harboring vulnerable parasites. All of the *A. lineata* were removed from one bird, half of them from the other that was harboring this parasite, giving the Black Leaf 40 an efficiency of 75 per cent. Two of these birds were parasitized with microscopic tapeworms and the kamala did not remove this parasite from either bird.

3. Group E: This group included a large number of birds, treated at various times, in which the efficiency of Black Leaf 40 plus 15 grains of kamala, given in the same capsule, was compared with that of Black Leaf Pellets and 15 grains of kamala given simultaneously. One-half of each group received one treatment and the other half the other, the different groups being as nearly comparable as possible, as far as external appearance, weight and breed were concerned.

(b) This group consisted of five birds, three of which harbored *A. lineata* or tapeworms. The vermifuge removed one-half of each of the parasites present, giving an efficiency of 50 per cent.

(c) This group consisted of three birds, only one of which was parasitized. All of the tapeworms and all except two *A. lineata* were removed from this bird. The efficiency was 75 per cent.

(g) Five birds made up this group and practically no parasites were found. None were voided with the droppings and but one *A. lineata* was found upon autopsy of the entire group. The efficiency was nil.

(i) This group consisted of three parasitized birds. All of the parasites were removed from each of two birds and fully 75 per cent from the other, giving an efficiency of 91+ per cent.

(k) This group consisted of four birds, only two of which were parasitized. All *A. lineata* and tapeworms were removed from one bird and none were removed from the other, giving an efficiency of 50 per cent.

(m) Five birds, four of which were found to have been harboring vulnerable parasites, made up this group. All parasites were removed from each of these birds. The efficiency was 100 per cent.

(o) This group consisted of five birds, four of which were parasitized. All parasites were removed from three birds. One *A. lineata*, the only parasite present in the other bird, was not removed. The efficiency was 75 per cent.

(q) Four birds, three of which were parasitized, made up this group. All parasites were removed from each of the three parasitized birds. The efficiency was 100 per cent.

The average efficiency of Black Leaf 40 plus 15 grains of kamala, in removing *A. lineata* and tapeworms from the 52 birds, of which 29 were harboring these parasites, was estimated to be 65.4 per cent.

The use of nicotin sulfate plus 15 grains of kamala was tried out under field conditions on the University of Arkansas poultry flock. The treatment used consisted of 0.2 cc of Black Leaf 40 added to 15 grains of kamala powder in a capsule.

A group of Rhode Island Red pullets was selected and divided into two evenly matched lots. Both lots were treated at the beginning of the test period, on October 2, 1932. Lot II (the check pen) received no additional treatment, while the birds of lot I were treated November 1, December 22, 1932, February 22, and June 28, 1933, respectively, in addition. The treatment in each case was administered during the afternoon, the birds having received no feed that day and no grain feed the previous evening. Both lots were managed identically, with the exception of the vermifuge treatments. Limited range on hardware-cloth sunpens was allowed.

Table I gives the initial weight, the average weight gain, the mortality and the average number of eggs laid by both groups at the end of 264 days following the beginning of the experiment.

Figure 1 shows the average egg production for the treated and

TABLE I—*Summary of data on vermifuge test. Progress report for period October 2, 1932-July 22, 1933 (264-day period).*

PEN	DATE OF TREATMENT	AVERAGE INITIAL WEIGHT (LBS.)	AVERAGE[1] FINAL WEIGHT (LBS.)	AVERAGE GAIN (LBS.)	MORTALITY[2] (%)	AVERAGE EGG WEIGHT (GM)	AVERAGE NUMBER EGGS PER PULLET
I (Treated)	Oct. 2 Nov. 1 Dec. 22 Feb. 22 June 28	4.75	6.00	1.25	16.6	56.4	141.4
II (Check)	Oct. 2	4.67	5.94	1.27	20.0	57.3	126.4

[1]Average weight for June 1.
[2]Pullets removed on account of poor condition.

the check pens, plotted to show the variation from week to week.

An examination of table I shows that the pen that received five treatments of this vermifuge at the end of 264 days had gained but slightly less in weight, had suffered a lower mortality, and had laid 15 eggs more per bird than the check pen that had had but one treatment of the vermifuge.

Figure 1 gives in graphic form the average egg production for the 264-day period. The graph shows that while the average egg production of the treated pen is considerably higher than of the check pen, there was a greater variation in the number of eggs laid. This decrease in the production of eggs was greater following the treatment in December, February and June. Each

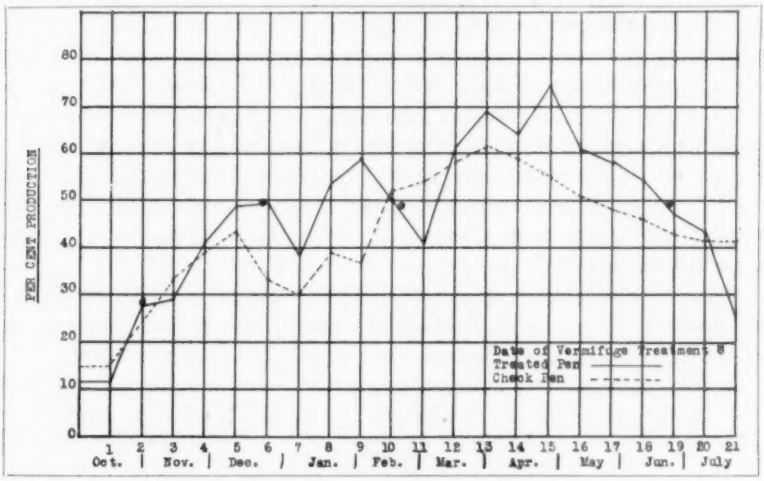

FIG. 1. Chart showing average egg production for treated and non-treated pens.

decrease in production was followed by an even greater increase in the number of eggs laid, which accounts for the uneven rate of production of the treated pen as compared to the relatively even production of the check pen.

The test is to run for one year, at the end of which the birds of both groups will be autopsied and the worm infestation of both groups compared.

These results indicate that the repeated vermifuge treatments as given had a tendency to increase the average egg production. However, the rate of egg production was much more uneven than in the pen treated but once. The effects of treatment appeared to be of shorter duration when the birds were starved properly

and when care was taken to have the nicotin sulfate wiped off the outside of the capsule.

It was thought that perhaps the toxicity of nicotin sulfate in the form of Black Leaf 40 would be less if injected directly into the gizzard rather than into the crop. In other words, was there greater absorption of the toxic principle from the crop than from the gizzard and intestine?

In order to answer this question, a group of five White Leghorn hens was selected. Black Leaf 40 was mixed with sufficient water so that each ounce contained 0.5 cc of Black Leaf 40, the amount that had been administered to a number of fowls with no bad effects having followed. This was injected directly into the gizzard by means of the syringe devised by Dr. W. L. Chandler for the administration of Iodine Vermicide.

The results were immediate. By the time the second bird was treated the first was prostrated and died in less than five minutes. While the first was being observed, the second became prostrated and promptly died. A second solution was then prepared, in each ounce of which there were five drops of Black Leaf 40. Each of the three remaining birds received one ounce of this material injected in the same manner and they died almost as promptly as the ones receiving 0.5 cc of Black Leaf 40.

This shows that absorption of the toxic principle of nicotin sulfate is more rapid from the gizzard and intestine than from the crop.

The Tobacco By-Products Corporation has recently placed a nicotin sulfate worm expellent on the market, which is claimed to be non-toxic and in which the active principle does not become available until after reaching the intestine. These are called Black Leaf Pellets.

Black Leaf Pellets, in conjunction with 15 grains of kamala, were used to treat 44 birds, of which 24 were found to have been harboring vulnerable parasites. The results in the use of this combination of vermifuges in this group of birds were very good. The group was divided into nine subgroups, from five of which all *A. lineata* and tapeworms were removed and in another subgroup of five but one *A. lineata* remained in the intestine of one bird. In the entire group of 24 parasitized birds, this combination was 82.1 per cent effective.

The use of the Jen-Sal Avian Kamala-Nicotin Tablets Rx C was reported in a previous paper.[10]

In the regular routine in the testing of vermifuges, this treatment was administered to a total of only twelve birds, ten of

which were parasitized and in this test it was found to be 66.7 per cent efficient.

One group of seven birds received a second treatment after a period of two weeks. These fowls were not autopsied but the droppings were examined for parasites that had been voided 48 hours following each treatment. It was found that the second treatment removed a number of parasites and showed it to have been of value.

The Jen-Sal tablets also were tested under field conditions. A group of White Leghorn pullets was given one treatment and then divided into two representative lots. The check lot received no further vermifuge treatment, while the other received four additional treatments. The repeated use of these tablets did not appear to be of any particular value.

One commercial "double duty" capsule, in which nicotin and kamala are combined with other drugs, was used on a total of 39 birds, of which 19 were parasitized.

In this group of birds this vermifuge was estimated to have been about 50 per cent effective in removing ascarids and tapeworms. All of these were removed from the intestine of nine birds. Seventy-five per cent were removed from one, and 50 per cent from two others. However, none of these parasites were removed from seven infested birds. In two birds the vermifuge removed tapeworms but did not effect the ascarids present.

SUMMARY

1. Pulvules No. 142 (Lilly) were used to treat a total of 32 birds, with an efficiency of about 72 per cent, when combined with 15 grains of kamala.

2. (a) Avian nicotin-kamala tablets (Jen-Sal) were used to treat 12 birds, with an efficiency of 66.7 per cent.

(b) Seven birds were treated twice, the second treatment following the first in two weeks and parasites were voided following each treatment.

(c) One group of 15 White Leghorns received repeated treatments, and their gain in weight and egg production were compared with those of another group of comparable birds. It was found that repeated treatments were of no advantage in increasing egg production or in improving the health of the birds.

3. (a) Black Leaf 40 combined with fifteen grains of kamala was used to treat 135 birds, with an estimated efficiency of 65.7 per cent.

(b) Under field conditions one group of Rhode Island Red pullets, which received five treatments with this combination, made

slightly less growth but produced 15 eggs more per bird than a comparable group of birds which received one treatment only. Three of the treatments caused a marked reduction in the production of eggs, resulting in an uneven rate in egg production.

4. Black Leaf Pellets were used to treat 44 birds, 24 of which were parasitized, with an efficiency of 82.1 per cent when combined with 15 grains of kamala.

5. Jen-Sal Avian Kamala-Nicotin Tablets were used to treat 12 experiment birds, with average efficiency of 66.7 per cent. Seven birds were treated twice and parasites were voided following each treatment. In field tests repeated treatments were of no more value than one treatment before the birds came into production.

6. One commercial "double-duty" capsule was administered to 19 parasitized birds with not over 50 per cent efficiency.

These results would indicate that nicotin-containing vermifuges are effective in removing *Ascaris lineata* from fowls harboring this parasite and, when combined with kamala, are effective against tapeworms also.

While Black Leaf Pellets gave slightly better results in our tests, this slight difference is probably not significant. While Black Leaf 40 appeared to be an effective vermifuge, its depressing action in producing birds and the fact that toxic symptoms follow its use in some birds make it of questionable value and therefore it cannot be highly recommended.

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RECOGNITION OF THE MOST IMPORTANT INFECTIOUS DISEASES OF SWINE IN THE UNITED STATES*

By FRANK BREED, *Lincoln, Neb.*
Norden Laboratories

The wording of the title may need a slight explanation, in that one might be misled by interpreting this to mean the differential diagnosis of these diseases by clinical manifestations and the gross pathological lesions found. This is not the manner in which it is used. It is just stating that we do recognize in our cataloging of swine diseases what we consider the three most important infectious diseases of swine in this country: hog cholera, infectious enteritis (pig typhus) and swine erysipelas.

History: In reviewing the available American literature on swine diseases, we find in the early nineteenth century some confusion, but the accepted swine disease at that time was cholera. Hog cholera first was recognized in an epizoötic occurring in Ohio in 1833. This was followed by reported outbreaks in Indiana, 1853; Rhode Island, 1861, and New York, 1875.

This was considered the only infectious disease of swine and the causative agent was recognized by Salmon and Smith, in 1885, by the isolation and careful study of a microörganism which was so consistently present in the tissues of the sick animals. This organism was called *Bacillus cholerae suis.* In 1886, Smith described an entirely different infectious disease of swine due to an organism belonging to the present Pasteurella group. These were the two recognized infectious diseases in swine, at this date; *B. cholerae suis,* causing the pathological changes mainly of the digestive tract and the Pasteurella causing swine plague, in which the lungs mostly were involved.[1]

Investigations continued over a period of years, mainly relative to hog cholera, which was the principal infectious disease, causing tremendous losses to our swine industry. Various recipes, charms, prescriptions and patent medicines were used in the control of this disease without results. Smith with his co-workers attempted an experimental immunization against the disease with the organism isolated and considered the primary cause, but the results were erratic, uncertain and confusing.

Dr. E. Schweinitz was the first to become suspicious that some factor other than *B. cholerae suis* was the cause of these erratic

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results and it was as a result of his experimental work and channel of thought that Dorset, Bolton and McBryde were led to take up his work, which was terminated by his death, and which at last resulted in the final determination of the true etiology of cholera, the filtrable virus, reported in 1905.[2] When these classical data were published, with all the experimental background, the work was accepted immediately by the American investigators and this became the classical and practically the only widely recognized infectious disease of swine in America.

One very outstanding factor relative to this investigation by Dorset, Bolton and McBryde was the fair consideration they gave to the possible importance that might be played by the organism *B. cholerae suis*, in the catalog of swine diseases. This is very well exemplified in their general conclusion on the etiology of hog cholera:

> The exact rôle played by *B. cholerae suis* in outbreaks of acute hog cholera is difficult to define. That the fatal result in many instances is materially influenced by the presence of that organism can not be doubted, and in addition we would emphasize the fact that although the filtrable virus appears to have been the primary invader, in those cases of acute hog cholera which we have studied, we do not deny the possibility of independent disease being caused by *B. cholerae suis*. In fact it is difficult to avoid a belief in such a possibility, on account of the very considerable pathogenic power for hogs exhibited by many cultures of that organism when fed or administered intravenously.

In reviewing the literature on swine diseases published in this country, following the discovery of the filterable virus of hog cholera, there is a noticeable absence of any reference to the organism *B. cholerae suis*, or its importance as an independent factor. This continued until 1912, when reference to this organism was made in discussing the nature of hog cholera virus.[3] Dr. Salmon stated:

> I do not believe that because a filtrable virus has been discovered which undoubtedly causes a disease, you can wipe off of the blackboard all the experimental results which were previously made and which showed the pathogenic character of the hog cholera bacillus, and its most constant association with that disease.

From these remarks one can readily see that Dr. Salmon still considered infection by *B. cholerae suis* a disease entity in swine, but as yet the importance of this organism in the confusion of infectious swine diseases had not been established definitely, independent of cholera. About 1918, many veterinarians engaged mostly in swine practice and many of the laboratorians began to question the possibility of some undetermined factor existing in their swine problems, many times in conjunction with cholera

outbreaks and also independently. This apparent infectious disease caused losses in both vaccinated and unvaccinated herds.

So-called necrotic enteritis became more prevalent in these herds and the many inquiries coming into the various scientific institutions without a question had much to do in stimulating the investigations of Murray, Biester *et al* in 1923, which resulted in establishing the definite fact that *B. cholerae suis*, now called *Salmonella suipestifer*, is the cause of infectious enteritis, and showing conclusively that this disease existed independently of cholera in both immunized and unimmunized herds.[4-5]

After it was finally determined that we had two independent, specific infectious diseases among our swine, which had been so intimately related in the various epizoötics since the early investigational reports, we felt for a short time that many of our difficulties relative to the diseases of swine were solved for once and for all. This feeling continued until the spring of 1930, when another acute bacterial infectious disease made its appearance and was identified as swine erysipelas.

This disease had been known to exist in the United States for some period of years, in the form of diamond skin disease and arthritis. Giltner[6] reported a fatal disease in young pigs, apparently caused by *B. erysipelatus suis*, but it was not accepted as existing here in the form of an acute septicemic disease causing comparatively heavy losses, until its presence was proven in certain areas of the Mississippi Valley.

The first definitely diagnosed outbreak of acute septicemic erysipelas, involving a large number of herds and animals, occurred in South Dakota in the practice of Dr. A. A. Fosterman. The live affected animals were brought to the author in May, 1930. After a careful autopsy and bacteriological study was made, we were able to identify the causative factor of this outbreak as *B. erysipelatus suis*. In January, 1931, Dr. Fosterman presented a paper before the South Dakota Veterinary Medical Association, giving a detailed and comprehensive description of the disease, stating that the final and clinching diagnosis was determined at a recognized laboratory, but overlooked giving due recognition to the scientific worker. As a result of this investigation, definitely establishing the presence of acute swine erysipelas, which has since been recognized by different investigators, in the Mississippi Valley and many different states in the East and South, we personally feel justified in making the bold statement that Dr. A. A. Fosterman, in conjunction with the author, was the first to prove the existence of this disease in the United States in the acute

septicemic form, involving a large number of animals and extending over a large area.

Time does not permit an attempt to enter into a differential diagnosis of these three diseases. Even though it did, there would be a doubt in the minds of many as to whether this could be accomplished at present, due to our lack of knowledge of many phases of erysipelas as it exists in the United States. There will be an endeavor to review the etiology, modes and vehicles of infection, and a comparison of the principal pathological lesions of the three infectious diseases in their order of importance as they exist in our swine industry today.

Hog Cholera

Hog cholera or swine fever is an actute, infectious, septicemic disease of swine readily transmitted and characterized by an initial high temperature, pronounced physical depression, loss of appetite, and a very high mortality.

Etiology: An ultramicroscopic organism capable of passing the pores of a Berkefeld filter and able to multiply itself in the body of susceptible swine.

Modes and vehicles of infection: In animals actually sick with the disease, the virus is present in the blood, all the body fluids, tissues, secretions and excretions. The infective agent is present in the various body discharges as follows (subcutaneous inoculation): blood and urine virulent on first day, feces infective on second day, and the eyes and nose secretions on the third day, whereas visible symptoms do not appear until the fifth day.

The most common means of spreading this disease is transportation of sick animals through areas containing susceptible herds or introduction directly into these herds. Various healthy animals, birds, blood-sucking flies, domestic animals, dogs and cats, as well as mechanical means such as wagons, trucks and other means of transportation are contributing factors.

Natural infection in the large majority of cases takes place through the digestive tract, by contamination of the food and water with the urine, feces and other discharges of an infected animal.

It has been shown that the disease will develop following the deposit of virus on the conjunctiva, abrasions of the skin or the bronchial mucous membrane. The virus is so highly pathogenic for swine—in one instance 0.00,002 cc produced disease—that it is almost impossible even to imagine all the avenues by which it may be introduced into a susceptible herd.

Infectious Enteritis (Pig Typhus)

Infectious enteritis or pig typhus is an infectious, bacterial disease particularly of young swine, occurring in either an acute or chronic form with temperatures ranging from normal to as high as 108° F.

Etiology: A member of the paratyphosus-enteritidis group, usually due to the member identified as *S. suipestifer*, formerly known as *B. cholerae suis*, isolated and identified by Salmon and Smith in 1885.

Modes and vehicles of infection: The mode of infection with this disease is by the mouth and digestive tract and, unlike hog cholera, it is particularly prevalent in young animals, while the mature or those reaching maturity are seldom affected. The spread of the disease is more or less limited, not occurring in epizoötics but most frequently appearing as an enzoötic and being limited to one premise or a comparatively small area. The organisms are eliminated in great quantities with the feces of the animals sick with the disease, or by mature highly resistant swine acting as carriers. The elimination of the infection contaminates the surroundings which may include the food and drinking water.

Predisposing factors: Once the premises become contaminated, unless a campaign of cleansing and disinfection together with strict sanitary measures are instituted, it will remain and be propagated from year to year. The appearance of the disease in the acute form in a herd may be induced by various outside influences. Rapidly growing young animals are highly susceptible to the infective agent. Changing of the ration, such as feeding new corn, farrowing of pigs too early in the spring, and damp, cold, filthy surroundings are considered as predisposing factors and many times precede an acute outbreak. The mortality in certain outbreaks will be as great as 60 to 80 per cent of the herd, whereas in less virulent infection the percentage of deaths may be low. However, many of the affected animals will have pathological changes of the digestive tract and other organs, which are more or less permanent in character and result in failure of the animals, to utilize the various food constituents. They become weak and stunted, thus causing a heavy economic loss.

Swine Erysipelas

Swine erysipelas is a specific, infectious, transmissible disease which manifests itself in four distinct forms: (1) as an acute septicemia, (2) as a benign urticaria (diamond skin disease),

(3) as a chronic valvular endocarditis and arthritis, and (4) as a necrotic dermatitis.[7-9]

Etiology: A small Gram-positive rod, usually slightly curved on its long axis. The pathogenicity of the organism is variable for swine, but pure cultures in such small quantities as 0.000,001 cc of a bouillon culture are readily fatal to white and gray mice. Pigeons are scarcely less susceptible and are killed within three or four days.

The organisms in certain outbreaks appear to be highly virulent and result in a high mortality, whereas in others the mortality is low, but the attack leaves the individuals in an unthrifty condition. The experimental reproduction of the disease in swine has been found difficult by the workers in this country. In fact there

TABLE I—*Hog cholera*

Attitude: Complete physical depression.
Appetite: Completely lost.
Temperature: 104°-106° F.
Duration: 4 to 7 days.

ORGAN	CHOLERA	INFECTIOUS ENTERITIS	SWINE ERYSIPELAS
Eyes	Slight clouding of cornea; sticky mucoid discharge; glueing of lids	No apparent change	Watery discharge; injected conjunctiva; lids not glued
Lymph-glands	Slightly swollen; hemorrhages involving entire glands; marble appearance of gland tissue in many outbreaks	Adjacent to digestive tract; swollen and engorged with straw-colored or clear lymph; may show congestion	Adjacent to digestive tract; swollen, edematous with blood-tinged lymph; marble appearance of gland tissue in many outbreaks
Kidney	Petechiae on surface, few in number; also present in cortex on cut surface; hemorrhages lacking in medulla	About normal in color or congested; usually no hemorrhages on surface, but large irregular hemorrhage in papilla	Acute: Diffuse nephritis; may have hemorrhages on surface varying in size and shape. Chronic: Usually pale, showing interstitial nephrosis
Bladder	Distinct petechiation of mucosa	May show some congestion; in certain outbreaks, entire mucosa involved with extensive hemorrhage formation	Mucosa thickened and congested; may show hemorrhages irregular in size and outline

have been very rare instances in which the disease could be reproduced with the organism isolated, when exposed by feeding, or by injection subcutaneously or intravenously. In surveying the disease as a whole, as it occurs in America, we have not as yet experienced the high mortality that is reported in Europe, which is 60 to 100 per cent, or an average of approximately 75 per cent.

Modes and vehicles of infection: The manner of infection usually is through some portion of the digestive tract. This may be by means of the pharyngeal mucosa, the tonsils or the mucous membrane of the intestines. Abrasions or wounds of the skin also may serve as portals of entry although this may be remote

TABLE II—*Acute infectious enteritis (pig typhus).*

Attitude: Thrifty, lack of depression.
Appetite: Comparatively good.
Temperature: Subnormal or normal to 108° F.
Duration: Found dead, to 72 hours.

ORGAN	INFECTIOUS ENTERITIS	HOG CHOLERA	SWINE ERYSIPELAS
Stomach	Usually filled; contents sour and offensive; mucosa swollen, beefsteak red; usually ulcers in various stages of formation	Empty; mucosa swollen and may show diffuse hemorrhage; ulceration also may be present	Partly filled; mucosa scarlet red; circumscribed areas or diffuse discoloration covered with thick sticky mucoid exudate; no ulcer formation
Colon and Cecum	Ileo-cecal valve and colon inflamed, with caseation; mucosa edematous, swollen; necrosis and ulcer formation; diphtheritic deposits	Severe enteritis, involving mucosa and submucous tissue; may be accompanied by hemorrhage in the mucosa	May show mucosa edematous and studded with small hemorrhages but no ulcer or diphtheritic exudate formation
Kidney	About normal in color or congested; usually no hemorrhages on surface but large irregular hemorrhages in papilla	Petechiae on surface, few in number, also present in cortex on cut surface; hemorrhages lacking in medulla	Acute: Diffuse nephritis; may have hemorrhages on surface varying in size and shape. Chronic: usually pale, showing interstitial nephrosis
Spleen	Swollen, congested, soft in consistency; dark purple or almost blue black in color; not constant	No change in size; may show hemorrhages or hemorrhagic infarcts on border; dark in color	Normal in size or moderately swollen; bright red or deep red discoloration; no hemorrhages but congested

or not common. Transportation of affected animals will spread the disease over large areas. The organisms are eliminated with the feces and urine, contaminating the litter, soil, water supply and possibly the food. Light sandy soil is liable to free itself of the infective agent in a short period, while heavy clay loam may retain the organism for long periods, in fact, from year to year. Mouse septicemia,[10-11] which is caused by an organism apparently identical, morphologically and culturally, may play a part in the spread of the disease in swine. The disease is considered more or less seasonal, in that its development is favored by hot weather, so that the outbreaks are more numerous throughout the Mississippi Valley from May to late September, although losses from this disease have occurred during the cold winter months.

TABLE III—*Swine erysipelas*

Attitude: Slight physical depression. Exceedingly vigorous when disturbed.
Appetite: Slightly impaired.
Temperature: 106°-108° F.
Duration: 24 to 96 hours.

ORGAN	SWINE ERYSIPELAS	HOG CHOLERA	INFECTIOUS ENTERITIS
Skin	Scarlet, congested circumscribed areas or diffuse; blanches on pressure	Hemorrhage, circumscribed or diffuse; does not blanch on pressures; turns dark before death	Normal, or may show purple hemorrhage before death
Extremities	May show swelling, hot and tender; joints enlarged, feet injected and tender; sloughing of tail and ears	Knuckling of pastern joint	No apparent change
Heart	Acute: Not much change. Chronic: enlarged, flabby, pale and possibly cauliflower growth on valves in left heart	Normal except in certain outbreaks; petechial or diffuse hemorrhages on auricles, especially right auricle; hyperemia of ventricle	In septicemic form may show hemorrhages; otherwise normal in appearance
Spleen	Normal in size or moderately swollen; bright red or deep red discoloration; no hemorrhages but congested	No change in size; may show hemorrhages on border; dark in color	Swollen, congested, soft in consistency; dark purple or almost blue black in color

The disease has caused heavy losses in swine of all ages, from the young suckling pigs to mature hogs. This seems to differ from the European disease in that losses in nursing animals seldom occur. This may be due to the lack of development of tolerance to the disease by the nursing sows.

Swine erysipelas in the United States is not to be considered as occurring in the form of an epizoötic such as cholera. The involved areas although they are increasing in number and extent, are still more or less enzoötic in character, but the precautions necessary to the control of highly infectious disease must be exercised, or within a comparatively short time swine erysipelas will be so prevalent and spread over such large areas that it will become one of the epizoötic diseases of swine in America.

The control of erysipelas in this country might lend itself to sanitary police measures and the practice of disinfection, but this is questionable, due to the saprophytic nature of the virus, which may play an important part in the spread of the disease, thereby rendering this means of control exceedingly difficult. As in the control of hog cholera, artificial immunization is the only practical method. Van Es[12] states relative to the use of artificial immunization:

> All methods of immunization of which the use of virus forms a part, should be confined to regions where swine erysipelas is a frequent or permanent problem. They have no place in territories where the disease does not commonly occur.

We concur completely in this statement and question strongly the advisability of permitting the live erysipelas organism to be used in conjunction with the serum for active immunization under the present existing condition. We must control the disease with serum alone if possible, together with strict police and sanitary measures.

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Equine Encephalomyelitis Appears in the East

Unusually numerous cases of infectious equine encephalomyelitis, sometimes erroneously called "sleeping sickness," have been reported to the live stock sanitary authorities recently. Studies of recent outbreaks, in Maryland, Delaware and Virginia, indicate that the disease is the same as the condition variously known as "forage poisoning," "staggers," "Kansas-Nebraska horse plague," and "cerebrospinal meningitis."

Intensive studies by the U. S. Bureau of Animal Industry show that the disease is of an infectious nature and is caused by a filtrable virus. This produces a disease which is very similar to one reported several years ago in California and which has occurred also in other states west of the Mississippi. However, it has been found that the eastern virus possesses certain distinct characteristics different from the virus causing the western disease.

An antiserum* has been developed in the West, where it has been used with apparently good results. The efficacy of this serum against the disease in the East has been questioned, and laboratory experimentation is in progress to determine the value of the western serum in combating the disease in the East. Until the studies now under way yield definite information, the authorities are recommending that affected animals be isolated and stables and other equipment be thoroughly disinfected. Healthy horses in areas where the disease already exists should be quartered in clean stables when not working, and protected as far as possible from mosquitoes† and other insects which are suspected of spreading the disease.

The symptoms of the disease are disturbance of the appetite, depression, and weakness, which are quickly followed by drooping of the head, sleepiness, staggering, walking in a circle, or trying to push through any obstacle with which the animal comes in contact. The animal soon goes down and is unable to rise, but may thrash violently with the feet and head. After reaching this stage the animal soon dies.

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RESULTS IN THE USE OF FRESH AND OXALATED BLOOD OF SWINE WHEN MAKING CELLULAR COUNTS AND HEMOGLOBIN DETERMINATIONS*

By H. C. H. KERNKAMP,

Division of Veterinary Medicine, University of Minnesota University Farm, Saint Paul, Minn.

Blood examinations which include an enumeration of the erythrocytes and leucocytes per unit volume, an enumeration of the different types of leucocytes (a differential leucocyte count), an examination of the morphologic and staining characteristics of the cellular elements, and an estimation of the amount of hemoglobin present, are often of great value as aids in the diagnosis and prognosis of disease. In this capacity the blood tissue has served the physician to a greater extent than it has the veterinarian. However, many veterinary pathologists, clinicians and others have been interested in extending this work to include diseases of live stock. Many investigations have been carried out and the data should help to establish a particular "blood picture" as typical and characteristic of some definite disease process.

The physical and technical difficulties often encountered in the collection and preparation of suitable material for making a blood examination are, we believe, some of the reasons why this type of work has not been more generally undertaken by veterinarians. It is difficult to fill a blood pipette accurately and make an acceptable blood-smear in a stable that is dark and dusty. Again, circumstances can be such that specimens of blood from several animals in the herd may be desired and it may be inconvenient or impossible to complete the examination immediately. Therefore, under conditions like these and others that may be cited, it would be to good advantage if the specimen or sample of blood could be collected and taken to a place where satisfactory preparations could be made.

Lewis and Shope[1] believed they had solved some of these difficulties when they mixed the freshly drawn blood with an anticoagulant and used that mixture for making smear preparations and for filling the hemocytometer pipettes. These authors report that cell counts made on these mixtures, 24 hours from the time

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of their collection, were comparable to those made immediately after the blood was drawn.

The idea of collecting the blood in an anticoagulant and deferring the filling of pipettes and preparations of smears to a later time appealed to us as a method worthy of further trial. In fact, if the "blood picture" is ever to become of diagnostic or prognostic value to clinical veterinary medicine, it will be when the laboratory phases of the examination can be deferred until an opportune time and place for making such examination can be obtained.

The studies on the "blood-anticoagulant mixtures" reported in this paper were made in connection with our studies on the blood pictures of anemic and non-anemic suckling pigs. The readings recorded on all the pigs in the "anemia" investigations are made on the fresh-blood basis, *i. e.*, the pipettes were filled and the smears made from the blood as it escaped from the puncture wound. These readings are taken as the standard, base or original readings, and the readings on the blood-anticoagulant mixture compared to them.

Method of Procedure

The procedures of filling pipettes, making dilutions, staining smears, and making the hemoglobin determinations on the fresh blood have been described by the writer in Technical Bulletin 86 of the University of Minnesota Agricultural Experiment Station.[2] The procedures with the blood-anticoagulant mixtures were as follows: The blood was collected from the puncture wounds in the ear vein or by cutting off a piece of the tail. It was collected in clean glass tubes containing crystals of potassium oxalate. The tubes were 10 cm long by 1 cm in diameter. Three-hundredths cc of a 20 per cent solution of potassium oxalate was placed in each tube and this evaporated to dryness over a Bunsen burner. One to 1.5 cc of blood was collected. The fresh preparations always were made first and then the "blood-oxalate" specimen obtained.

A portion of the blood-oxalate mixture was poured into a watch-glass preparatory to filling the pipettes and making the smears. Before it was poured, however, the tube was agitated to insure a thorough mixing of the blood. This is important. The steps for making the blood examination from this point were the same as with the fresh material.

It was arranged to make two or three examinations of the blood-oxalate mixture at different intervals. The first examination was made usually between three and five hours after the

specimen was collected. During this interval the mixture was left at room temperature. The second examination was made approximately 24 hours from the time it was collected, and the third examination was not made until 48 hours after collection. The mixture was kept in refrigeration at 38° F. between the first and second examinations and between the second and third.

The Findings

It is a well-known fact that it is practically impossible to make duplicate or triplicate erythrocyte, leucocyte, and differential counts or hemoglobin determinations that will give the same results. The mechanical technicalities inherent with the apparatus are to some extent responsible for these descrepancies. There is, however, another factor which plays an important rôle in this connection and that is the so-called "human element." These factors, within certain limits, must be accepted when interpreting the results of blood examinations.

The findings in connection with the observations on hemoglobin show that 25.8 per cent of the readings on the "blood-oxalate" mixture, which stood for three to five hours, were higher than the readings on the fresh specimen and 74.1 per cent were lower. The average of the readings that were above the readings on the fresh specimen was 0.4 gm per 100 cc and on those that were below the fresh specimen the average was 0.54 gm. When comparisons were made between the hemoglobin values obtained with the freshly drawn blood and those of the blood-oxalate mixture that was 24 hours old, it was found that 30.3 per cent of the readings were greater than the original and 69.3 per cent lesser than the original. The averages in this case were equal to 0.66 gm for those above the base values and 0.84 gm for those below. The hemoglobin readings on the blood-oxalate mixtures that were made 48 hours after the sample was collected resulted in 57.1 per cent with readings greater and 42.8 per cent with readings less than the fresh sample. The average of the readings indicating an increase of hemoglobin over the base reading was 0.52 gm, while 0.63 gm was the average of those indicating a less amount of hemoglobin.

The hemoglobin determinations on the samples of oxalated blood which were left standing, from three to 48 hours from the time they were collected, show that between 0.4 and 0.84 gm per 100 cc of blood was the average variation above or below the values obtained for the fresh sample. The range of the variation, except for one case, never exceeded 1.1 gm. While there is no

way of knowing definitely if the result obtained on a given blood-oxalate sample represents a value that is greater or less than the value on the same sample when freshly drawn, the data, however, show that as the time between the collection and examination of the oxalated samples increases, a tendency for the readings indicating hemoglobin values which are greater than the fresh samples occurs. It is concluded from these results that hemoglobin determinations by the Newcomer method, on oxalated blood mixtures examined any time up to 48 hours after being obtained, give values which compare quite favorably with the values obtained when fresh blood is used.

Comparisons between red-cell counts made on fresh and oxalated blood show that 24.1 per cent of the counts on the blood-oxalate mixtures examined between three and five hours after the sample was collected were higher than the counts made on the freshly drawn blood. The average increase was 415,000 cells per cmm. Seventy-five and eight-tenths (75.8) per cent of the counts at this interval were lower than the fresh sample and the average decrease was 408,000 cells. The blood-oxalate mixtures that were examined 24 hours from the time they were taken show that in 32.2 per cent of the cases the counts were greater than the number recorded for the fresh sample and 67.7 per cent were less. The averages on the counts that were greater and on those which were less were approximately the same. Thus, an increase of 661,000 cells was obtained on the former and 617,000 on the latter. The greatest difference between the fresh and the 48-hour oxalated sample was 1,490,000 cells per cmm. This represented a decrease in the number counted. The erythrocyte counts made on the blood-oxalate mixture which, for the greater part of 48 hours, was kept under refrigeration, resulted in every instance in values that were less than those obtained on them when fresh. The average decrease per specimen was 565,000 cells and the range was from 30,000 to 2,070,000 cells per cmm.

The fact that the counts on the oxalated blood three to five hours old averaged approximately 400,000 cells per cmm. above or below the recorded number on the fresh blood cannot be taken as a condemnation of the method of making blood-oxalate mixtures for filling the blood pipettes when it is not convenient to use the freshly drawn blood. A variation of 500,000 is not uncommon when making counts of the same sample spread on the two counting-chambers of a single hemocytometer. However, the 400,000 represents the average difference, and the percentage of counts that were less than the original is great enough to warrant the

conclusion that red-cell counts made from blood-oxalate mixtures are more likely to be under those made from fresh samples. As further support of this contention, the results of the 48-hour observation show that 100 per cent of the observations resulted in counts that were below the fresh count. Stained smear preparations with this material show many disintegrating and markedly crenated red cells, which of course would be difficult or impossible to recognize and count in the counting-chamber. Erythrocyte counts made on blood-oxalate mixtures have but little value unless the examination is made within several hours from the time the specimen first was collected.

Leucocyte counts were made at the same time the red blood cells were counted. The examinations that were made between the third and fifth hours after collection showed that 29.0 per cent of the observations indicated counts which were above the fresh or base and 70.9 per cent below. The examination that was made after the mixture stood 24 hours resulted in 12.9 per cent of the counts being higher than the fresh blood counts and 87.0 per cent were lower. The results on the counts made at the 48th hour were like those on the erythrocytes, *i. e.*, in no case were any of the counts greater than the count which was recorded for the fresh sample. The average increase of leucocytes per cmm of blood, on all the observations where a count greater than the base count is recorded, was 3,300 cells and the range varied from 0 to 9,000 cells. In the case of the counts that showed fewer white cells per cmm the average per sample was 6,580 cells and the range 0 to 18,670 cells.

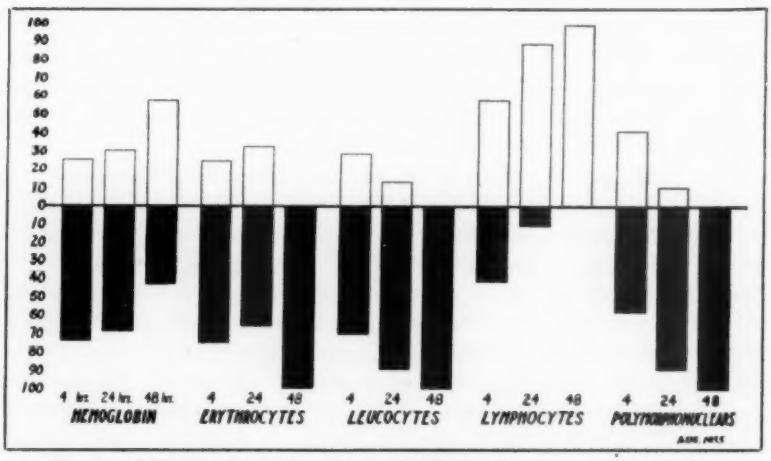

FIG. 1. "Blood pictures" with oxalated blood. Percentage of observations above or below the base reading.

It appears from these results that a total white cell count on oxalated blood cannot be relied upon as comparable to the results made on the freshly drawn blood. The results, however, were most comparable on the specimens that were examined within three to five hours after they were collected and least comparable on those examined 24 and 48 hours from the time they were obtained.

Inasmuch as differential leucocyte counts are often an important part of a blood picture, smear or film preparations were made with the blood-oxalate mixtures, then stained with Wright's stain and these compared with similar preparations using the freshly drawn blood. Comparisons between the fresh and oxalated bloods when the eosinophils, basophils and monocytes were studied were unsatisfactory. This was not because they were unstained and therefore not seen, but because, first, of their normal relatively small numbers; second, a relative increase in lymphocytes, and third, the probability of some being lost by disintegration. The counts on the cells recorded as lymphocytes and polymorphonuclear leucocytes are of interest. It was found that 58.3 per cent of the smears made from the "blood-oxalate" mixtures which were from three to five hours old showed an increase of lymphocytes and a decrease of polymorphonuclears when compared to the counts on the same blood when prepared from a freshly drawn specimen. At 24 hours, 89.4 per cent of the oxalated blood smears indicated increases of lymphocytes and decreases of polymorphonuclears, and the 48-hour examinations resulted in 100 per cent of the oxalated blood smears showing increases of lymphocytes and decreases of polymorphonuclear leucocytes. The amount of increase in lymphocytes at the first examination period (three to five hours) was equal to an average of 8.6 per cent per specimen; 12.5 per cent at the second examination period (24 hours) and 11.5 per cent at the third period (48 hours). The increases in polymorphonuclears at each of the two periods where increases were noted were equal to an average of 7.6 per cent per specimen at the first and 7.3 per cent at the second. The lymphocytes decreased on an average of 8.3 per cent at the first examination and 10.0 per cent at the second, while the polymorphonuclears at the same time decreased an average of 8.6 per cent per specimen at the first, 13.0 per cent at the second and 10.0 per cent at the third.

The very striking converse relationship between lymphocytes and polymorphonuclears observed in this study is, of course, not real. In part this may be explained by the fact that the poly-

morphonuclear leucocytes were less stable in the blood-oxalate mixture. It was not uncommon to find what appeared to be disintegrating and ruptured or "fractured" granulocytes in the smears made from the oxalated blood and unless their identity could be definitely ascertained, these cells were passed by. Furthermore, because of the intense staining which not infrequently occurred with some of the smears, it was thought that some of the non-segmented polymorphonuclears and especially the monocytes were indistinguishable from lymphocytes and therefore taken for them. These conditions occurred most often with the material that was 24 and 48 hours old. The results indicate quite clearly that differential leucocyte counts on oxalated blood may give values that are decidedly at variance with similar counts on freshly drawn blood.

The process of vital staining to demonstrate the reticular material in immature red cells was applied to blood-oxalate mixtures in a number of instances. The object in this case was to determine whether or not reticulocytes could be stained and demonstrated in blood that was mixed with potassium oxalate. The results proved very definitely that reticulocytes did not lose their staining properties by this treatment. No attempt was made to study, by enumeration, differences between the percentage of reticulocytes present in fresh preparations as compared to the percentage demonstrable in oxalated blood.

Conclusion

While it is possible to use a blood-oxalate mixture for making the various examinations included in a blood picture, the results are likely to give values that are significantly greater or less than the blood picture obtained from freshly drawn blood, and whereas these studies show that as the interval of time increases, between the drawing of the blood and the making of the examinations, there is a tendency for the hemoglobin value and the relative percentage of lymphocytes to increase, the total number of red and white blood cells per cmm and the relative percentage of polymorphonuclear leucocytes to decrease, yet there is no definite relationship to indicate whether these tendencies can be applied uniformly to any given sample of oxalated blood.

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THE TOXICITY OF BAILEYA MULTIRADIATA FOR SHEEP AND GOATS*

By FRANK P. MATHEWS, *Alpine, Texas*
Loco Weed Laboratory, Texas Agricultural Experiment Station†

Some heavy losses of sheep on a ranch near Marfa, Texas, were called to the attention of the writer on August 5, 1931. The losses began in June and continued until the latter part of August, during which time a mortality of approximately one thousand head occurred amongst a flock of eight thousand to nine thousand ewes and lambs. All ages were affected. The death rate was particularly high among the sheep of two pastures, no significant mortalities having occurred in a third pasture, which was located on a high plateau and more or less isolated from the remainder of the ranch. Since the history, symptoms, and lack of lesions suggested that the etiology was probably some poisonous plant, Mr. V. L. Cory, Range Botanist, was called upon to assist in the investigation to determine the plants found on the range.

The ranch consisted of fifteen sections and was very much overgrazed. Suitable forage was practically exhausted and although several poisonous plants were identified, they did not appear to have been grazed upon in sufficient quantities to account for the heavy mortalities. *Baileya multiradiata* Harv. & Gray (fig. 1) was abundant in two of the pastures but was an uncommon plant in the one pasture in which no significant losses had occurred. It was evident that the sheep were grazing almost exclusively on the Baileya, and since nothing was known concerning its toxic properties, a study of this phase of the plant was undertaken.

BOTANICAL DESCRIPTION OF BAILEYA MULTIRADIATA‡

The many-rayed Baileya is a showy and handsome plant that has been variously classed as an annual, a biennial and a perennial. It is likely that it varies in accordance with the conditions under which it grows. The plant is densely clothed with flocks of soft wool, much branched at the base, leafy, and grows a foot or two tall. The basal and lower leaves are broader, tongue-shaped and mostly cut into narrow lobes, while the uppermost leaves are narrowly tongue-shaped, are entire, and much smaller than the lower leaves. The heads are large, solitary, on slender and often long stalks, and consist of ray and disk flowers, both of which

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‡The description of the plant was prepared by V. L. Cory, Texas Agricultural Experiment Station, Sonora, Texas.

are seed-producing. The involucre is hemispheric, about ¼ inch high and ⅜ inch or more broad, and consists of numerous narrow, pointed bracts in two or three series, which are very woolly on the back. The ray flowers are forty, more or less, in number (25 to 50), bright yellow, persistent, deflexed in age and become thin, dry and papery; the corolla is about ⅝ inch long and ¼ inch broad, oblong and narrowed to the base, three-toothed and distinctly seven-nerved, two nerves outlining each tooth, including a nerve running midway between them towards the apex of the

FIG. 1. *Baileya multiradiata.*

tooth. The disk flowers are very numerous, three hundred or more to the head. The corolla is tubular, 3/32 inch long with five glandular bearded teeth. The one-seeded fruits are oblong, angled and marked with obscure ridges, less than ⅛ inch long, twice as broad at the flattened apex as at the bottom, and are without hair, but are slightly rough to the touch. There is no pappus.

The many-rayed Baileya occurs from Southern California to west Texas and southward into Mexico. It flowers in the spring, but may continue flowering late into the fall. In the Trans-Pecos

area of Texas, it is found in some abundance chiefly in sandy plains or valleys.

Experimental Feeding of B. Multiradiata

The green and dry plant was fed to both sheep and goats. All the animals showed considerable reluctance to eat the plant in either its green or dry state, but by the addition of blackstrap molasses this reluctance was soon overcome. As the willingness to eat the plant was increased, the amount of molasses was decreased gradually until the animals were induced to eat sufficient amounts of the Baileya without the addition of other food. The results of the investigation are summarized in table I.

Table I—*The results of feeding Baileya multiradiata to sheep and goats.*

Animal	Weight (Lbs.)	Plant Fed (Lbs.)	Feeding Period (Days)	Results
S16	90	58 dry	94	Prostrate three times; died
S14	60	34 dry	87	Prostrate three times; died
S15	65	19 dry	23	Found dead morning of 23rd day
S25	70	18 dry	25	Found dead morning of 25th day
S20	80	65 green	67	Prostrate four times; died
S26	70	59 green	64	Prostrate four times; died
G38	65	16 green	36	Prostrate two times; died
G18	101	51 dry	34	Prostrate one time; died

The results showed that the plant was toxic in either the green or dry state, and that there was a wide variation in the susceptibility of the animals to the toxic principle. This is shown quite clearly by the fact that 18 pounds of the dry plant (equivalent to 41 pounds of the green) was sufficient to produce death in sheep 25 in 25 days, whereas sheep 14 ate 34 pounds of the same lot of dry plant in 87 days before death occurred. The amount of green plant required to produce the same results fell between these two limits, from which it is assumed that there is probably very little difference in the toxic content of the green or dry plant. Sheep 16 was fed plants which were collected prior to blooming. The remainder of the animals were fed more mature plants. The fact that it required 58 pounds of the young, dry plant to produce death in sheep 16 suggests that the young plant is slightly less toxic than the more mature plant. However, such evidence is far from conclusive.

Symptoms

On the range, the affected animals would be found either standing in one place with the back more or less arched and indisposed to move away when disturbed, or they would be lying down and would not get up when approached. They would not follow the flock, showed a stiff gait, marked weakness and trembling, especially when urged to travel, and had stopped feeding. The occurrence of vomition was reported by the owner but was not observed by the writer. When affected animals were taken to the corral and offered good feed, they refused to eat for a number of days, would remain lying down most of the time, but eventually began to eat and a large percentage would recover.

In the feeding test reported herein, the majority of the animals, including the two goats, showed symptoms analogous to those observed on the range. The first symptom noted was an accumulation of a frothy, green slobber around the mouth in the morning before the animal was fed. The slobbering resulted in a greenish discoloration around the mouth and under the lower jaw. Actual vomiting was not observed in these tests. The next symptom observed was a rapid, thumping heart action when the animal was exercised. The pounding of the heart was plainly audible at a distance of at least eight feet. This pounding heart action was not observed on the range, by reason of the fact that the sick animals observed were not forced to exercise, which is necessary to bring out this symptom. The animals thereafter would begin to show other signs of illness and would lie down much of the time. When forced to stand, they would place all four feet close together, with the back arched and the head lowered, until it almost touched the ground.

There was marked trembling of the limbs and weakness, and the animal could be forced to stand only for short periods. Such cases invariably became prostrate and remained thus for two to four days and during this time refused all food. When the animal recovered from the prostration, it resumed feeding, although weakness was still very much in evidence (fig. 2). The illness finally subsided and the Baileya again was consumed, with moderate avidity for a variable period of time, when prostration occurred a second time. When feeding of the plant was interrupted at the proper time, before too much of the plant was consumed, this chain of symptoms could be repeated two to four times before death occurred. The first evidence of illness was followed by rapid loss of weight. The temperature remained normal as did the respiration and pulse as long as forced exercise was omitted.

Urination was of frequent occurrence in some cases but of normal occurrence in others.

In two cases, sheep 15 and 25, the only symptoms observed were the green froth around the mouth and the thumping heart action when the animals were exercised. Both died unexpectedly.

PATHOLOGY

Extensive hemorrhages beneath the epicardium and in the diaphragm; congestion of the liver, spleen and cortex of the kidney, and injection of the mesenteric vessels were observed in the

FIG. 2. Sheep 16, shortly after recovering from the first prostration.

more acute type of poisoning. In the cases of longer standing the lesions were likewise of little signifiance. There was a dilatation of the heart, lack of muscular tone, and thinning of the walls of the ventricles. This change evidently required considerable time to develop, as it was pronounced in only the cases of longest standing. Slight inflammation of the ailmentary tract was observed in some cases, but not in others.

Microscopically the liver showed congestion, albuminous degeneration of the parenchyma and moderate fatty changes. There was congestion of the kidney and albuminous degeneration of the tubular epithelium of the cortex. Hyalin casts were of frequent occurrence in the tubules of the pelvic portion. Zenker's degeneration of the myocardium appeared to be the only significant

lesion. As a rule this change was confined to single cells, with the surrounding cells showing the normal staining reactions, but occasionally all the cells in a bundle would show some involvement. Liquefaction and the leucocytic response which is part of this retrograde process was demonstrated in but one case (sheep 16). The fact that this sheep ate more of the plant than any of the other animals is probably significant. No change was demonstrated in the total erythrocyte or leucocyte content of the blood. Differential leucocyte counts also were normal.

Discussion

It is apparent that the symptoms and lesions in this type of plant poisoning are of little value in rendering a diagnosis. Therefore, the diagnosis, as in the case of many other poisonous plants, must be governed to a large extent by the identification of the plant and whether or not it is being eaten. The mere presence of the plant in a pasture in which losses are occurring is not sufficient evidence to establish a diagnosis. The tendency to produce hemorrhages in the more acute cases is of no diagnostic value and will result only in confusion if such lesions are given any consideration except in conjunction with other evidence.

From field observations it is evident that this plant is of the greatest danger to sheep during unfavorable range conditions. Due to a natural distaste for the plant, it is doubtful whether or not sheep would eat it in the presence of suitable forage. In this connection it is of interest to note that losses from *B. multiradiata* on the range have subsided as soon as the rainfall was sufficient to provide suitable forage. However, the presence of this plant in sheep ranges must be viewed with some apprehension, since favorable range conditions can not be maintained at all times.

Although the plant was proven to be poisonous for goats, nothing is known concerning its economic importance in this animal. It is somewhat doubtful that goats ever eat this plant under range conditions.

No losses have been observed in cattle from this plant. Some ranchers claim that cattle rarely, if ever, eat the plant; others that it is eaten quite extensively under unfavorable range conditions. At this time an inadequate amount of experimental feeding suggests that the plant is not poisonous for cattle. However, more investigation will be required before a definite conclusion can be drawn.

SUMMARY

An investigation of sheep losses suggested that *Baileya multiradiata* was the cause.

The plant was proven to be toxic for sheep and goats.

The pathology and symptoms associated with this form of poisoning were of little assistance in rendering a diagnosis.

The plant appears to constitute a danger to animals only under unfavorable range conditions.

Purdue University Veterinary Short Course

The 1933 Veterinary Short Course at Purdue University will be held November 14-15-16, according to an announcement made by Dr. R. A. Craig, of the Department of Veterinary Science.

Tuesday afternoon, November 14, will be devoted to postmortem findings on poultry, hogs and other animals, discussed by members of the veterinary staff. A discussion of Bang's disease will follow.

Wednesday morning, November 15, there will be a poultry disease laboratory period and, in the afternoon, addresses by specialists on subjects of timely interest to veterinarians. In the evening, a dinner-meeting will be held in the Memorial Union Building, with the principal address by Dr. J. L. Axby, State Veterinarian.

Thursday morning, November 16, there will be a large-animal clinic, with Drs. T. H. Ferguson, W. B. Craig and J. F. Bullard participating. In the afternoon, Prof. O. C. Lee will discuss "Indiana Plants Poisonous to Live Stock." Dr. Craig will speak on "Diseases of Sheep" and Dr. Ferguson will follow, on "Bovine Mastitis."

First Caller

Dr. John F. McKenna, of Los Angeles, Calif., was the first veterinarian to call at the new headquarters of the A. V. M. A., in the La Salle-Wacker Building, Chicago. He stopped at the office on October 26, while en route from Los Angeles to New York.

Custom reconciles us to everything.—EDMUND BURKE.

12th International Veterinary Congress
New York—August 13-18, 1934

BANG DISEASE CONTROL WORK IN FOURTEEN STATE INSTITUTION HERDS*
II. Progress Report to 1931

By B. SCOTT FRITZ and M. F. BARNES
Pennsylvania Bureau of Animal Industry
Harrisburg, Pa.

This report on the control of Bang disease in 14 state institution herds is a continuation of work covered by the report[1] presented at the 1929 convention of the American Veterinary Medical Association, in Detroit. The first report, which was preliminary, dealt with the progress made in the control of Bang disease, the obstacles encountered in its control, the estimated cost of the disease based upon the comparative calf and milk production of positive and negative animals, the extent of infection, the number of abortions which occurred, a discussion of the plan used in the control of the disease, and conclusions.

The 14 herds involved in the preliminary report are now Bang disease-free. The first herd in this group was certified as Bang disease-free on April 23, 1928, and five were certified in 1929. A number of others qualified soon afterwards. Several of the herds have now been issued their fourth annual certificate. One break has occurred and there has been no other evidence of reinfection. A few abortions have occurred, due to causes other than Bang disease. The latest indication of infection, except as mentioned above, was revealed in October, 1929. Each herd has qualified annually by a blood test as Bang disease-free.

An increasing interest has prevailed among the managers in the different herds and a competitive spirit exists. Each institution is attempting to establish the most productive herd and the best individual cow production. There is a friendly rivalry among the institutions, and the managements are keenly interested in the production reports of each herd, published monthly by the Department of Welfare. The sanitation has been improved and there is an apparent improvement in herd management.

The milking group of animals is fed approximately a 20 per cent protein ration, though a few of the herdsmen hesitate to feed a ration as high as 20 per cent in protein. The roughage consists of a good quality hay and ensilage is fed to the milking cows. Some of the herds receive beets, mangles or carrots when available. The dry group is fed approximately a 12 to 14 per

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cent protein ration and roughage. Ensilage is fed to the dry cows in only a few of the herds.

The high-producing cows are milked three times a day in all but two of the herds and they remain on this schedule as long as they are producing 30 or more pounds of milk a day. It is of interest to observe the effect of this type of management upon the health and producing ability of these herds. Statements have been made frequently that breeding problems are associated with feeding for high production. It is planned to keep a close record of these herds for any variation in the breeding frequency. A continued study of the reproducing ability in these herds will furnish valuable data on the breeding frequency of individual animals in Bang disease-free herds.

The freshening interval is an influencing factor on the breeding frequency and for this reason it is reported in all herds available. From an institutional standpoint, it is desirable to have an equal number of cows freshen each quarter so that the daily milk production is fairly uniform throughout the year.

The data that appear in the following tables have been compiled from records kept on the herds. Animals which have not given birth to a second calf are not included. It was thought best to exclude them for the reason that many of the first-calf cows are pasture bred and the actual service dates and the number of services they received are not known. An explanation is necessary to inform the readers as to the manner in which each animal was charged with months for the production of a calf. The number of months charged each cow was computed from the first service date to the date of delivery of the last calf. In most cases but one breeding was required for conception, while in others it was sometimes necessary for the cow to be rebred a number of times. The cows usually are served on the third estrual period following freshening, except in the case of a high producer difficult to dry off, in which case the breeding is withheld so that they may stand dry for a period of a month to six weeks. This is an exception, however, rather than a recommended practice. A few of the low-producing cows are served at the time of the first estrual period observed following freshening. The herds are reported in the same consecutive order and by the same designations as they were reported previously, so that those interested may refer to the previous report.

HERD A

Table I covers the breeding frequency in herd A which was tested initially in 1924. It then comprised 70 head of mature

animals. The first blood test conducted for Bang disease revealed 49 per cent positive to the test. The herd was issued a Bang disease-free certificate for 83 animals on April 10, 1930. The herd is made up principally of young animals that have given birth to only one calf. For that reason there were very few animals to furnish information pertaining to their breeding frequency.

TABLE I—*Breeding frequency in herd A.*

COWS	CALVES	MONTHS	
		TOTAL	AVERAGE
16	33	364	11.03

Sixteen cows in the herd, that have had two or more calves, produced 33 calves in a total of 364 months, or a calf each eleven months. The calving distribution, including the heifers with their first calf, was as follows: Seven cows freshened the first quarter of the year, nine the second, six, the third, and six the fourth quarter, making a total of 28 that freshened in the year 1930. It is a mixed herd of Jerseys and Holsteins. The herd for the year 1930 averaged 8,380 pounds of milk per cow, or approximately 300 pounds per cow better than in the year 1929.

HERD B

Herd B is a high-producing Holstein herd and likewise is composed of many young animals. This herd was tested initially during an active outbreak of the disease and the test revealed

TABLE II—*Breeding frequency in herd B.*

COWS	TOTAL CALVES	MONTHS	
		TOTAL	AVERAGE
22	44	501	11.4
14	42	487	11.4
6	24	307	12.8
7	35	419	11.9
3	18	222	12.3
1	7	77	11.0
1	10	141	14.0
54	180	2,154	11.9

36 per cent infection. The present herd was raised almost exclusively from positive cows and only a few of the older original animals remain in the herd.

Fifty-four cows in the herd produced 180 calves in 2,154 months, with a calving interval of 11.9 months. Calving distribution, including heifers in the herd, was as follows: Eight cows freshened the first quarter of the year, 34 the second, 18 the third and 25 the fourth. Fourteen cows in the herd gave birth to twins during the year 1930. Two abortions due to other causes occurred, or 2.2 per cent of the total calves born in the herd for the year. The number of cows fresh was 85. The number of services required by the bulls is shown in table III.

TABLE III—*Services per calf in herd B.*

COWS	CALVES PER COW	TOTAL CALVES	SERVICES	
			TOTAL	AVERAGE
26	1	26	26	1.00
21	2	42	44	1.05
16	3	48	57	1.20
7	4	28	30	1.07
7	5	35	46	1.25
3	6	18	23	1.22
1	7	7	8	1.10
1	10	10	15	1.50
82	38	214	249	1.11

Eighty-two cows produced a total of 214 calves from 249 services, or an average of 1.1 per cent. The herd during the year 1930 averaged 9,554 pounds of milk per cow, approximately 1,000 pounds less per cow than it averaged for the year 1929. This was due to a comparatively large number of young animals in the herd. The low producers will be culled from the herd, which should result in an increase in the average cow production.

HERD C

This is a grade herd. It was certified as Bang disease-free on June 13, 1928, and has qualified each year for a renewal of its certificate without any evidence of infection. Many of the older animals have been removed in a culling program. The majority of milking animals in the herd at the present time are young animals and for that reason only a limited amount of information is available on their breeding frequency. Table IV

TABLE IV—*Breeding frequency in herd C.*

Cows	Total Calves	Months	
		Total	Average
15	30	337	11.2

is representative of the information which was gathered and summarized.

Twenty-six calves were born from June 1, 1929, to May 31, 1930. Eleven heifers freshened in this period and one abortion occurred due to causes other than Bang disease. The freshening interval, including heifers, was distributed accordingly: Eleven the first quarter of the year, seven the second, seven the third, and seven the fourth.

HERD D

Herd D is one of our larger grade and purebred herds. It was issued a Bang disease-free certificate on August 31, 1929. The herd had been culled rigidly and has made a very creditable increase in milk production. The herd averaged 7,548 pounds of milk per cow for the association year of 1929 as against 7,422 for the year 1928. In 1930 it averaged 9,426 pounds, with 92.5 as the average number of cows milking, and from November 1, 1929, to November 1, 1930, with an average of 87 cows milking for the association year it produced an average per cow of 11,283 pounds of milk. Eighty-six calves were born during the last association year, one of which was an abortion due to other causes.

TABLE V—*Breeding frequency in herd D.*

Cows	Total Calves	Months	
		Total	Average
17	34	399	11.7
18	54	599	11.1
14	58	638	11.4
1	5	57	11.4
1	6	68	11.3
8	56	706	12.6
1	8	111	13.9
1	9	93	10.3
61	230	2,671	11.6

Nineteen heifers in the herd freshened in their first lactation period. The breeding frequency of the herd is represented in table V.

Nineteen cows freshened the first quarter of the year, 17 the second, 22 the third, and 16 the fourth. With the following exceptions, all cows in the herd conceived with one service: Twenty cows required two services each, two cows required three each, and four cows required four each. Two rations are used in this herd. The dry cow ration is composed of 100 pounds each of corn, oats, wheat middlings, bran, oil meal and good hay. The milking ration is composed of (pounds): corn 50, bran 100, oats 100, wheat 50, cotton seed 75, oil meal 75, and alfalfa, ensilage, beets when available, and good hay.

Herd E

Herd E is one of the smaller herds which a few years ago was only an average milk-producing herd but now is one of the best producing of state institution herds. This herd just recently completed its cow testing association year with an average of more than 13,000 pounds of milk per cow. In 1928, the herd averaged 8,895 pounds of milk per cow.

Table VI—*Breeding frequency in herd E.*

Cows	Total Calves	Months	
		Total	Average
18	37	371	10.3

Four cows freshened the first quarter of the year, eleven the second, eight the third, and three the fourth. All mature cows in the herd freshened during the asscoiation year. No abortions occurred. This herd was certified as Bang disease-free on August 1, 1929, and since that time has qualified for a renewal of the certificate each year.

Herd F

Herd F is one of the smaller high-producing herds. It is composed of a large number of young milking animals, and many young growing females not yet in production. The herd was certified as Bang disease-free on August 26, 1929. Twenty-three cows in the herd have produced 73 calves in 914 months, or a calf each 12.5 months.

TABLE VII—*Breeding frequency in herd F.*

COWS	TOTAL CALVES	MONTHS	
		TOTAL	AVERAGE
8	16	184	11.5
5	15	186	12.4
8	32	432	13.5
2	10	112	11.2
23	73	914	12.5

Nine cows freshened the first quarter, three the second, six the third, and nine the fourth.

HERD G

This is the largest in number of animals of all state institution herds and possibly the best milk-producing purebred herd of its size in Pennsylvania. The herd has been Bang disease-free from November 30, 1928, and on subsequent blood tests has revealed no reactors.

TABLE VIII—*Breeding frequency in herd G.*

COWS	TOTAL CALVES	MONTHS		RANGE
		TOTAL	AVERAGE	
33	66	737	11.16	9.5–13.5
16	48	566	11.79	10.7–15.7
14	56	672	12.00	10.0–13.0
11	55	680	12.36	9.6–15.4
5	30	382	12.73	12.5–14.7
6	42	505	12.03	12.0–14.3
3	24	295	12.29	11.6–15.2
3	27	336	12.44	11.7–14.4
3	30	399	13.30	12.0–14.2
3	33	391	11.84	11.7–12.5
3	36	449	12.19	11.4–12.9
100	447	5,412	12.11	9.5–15.7

HERD H

This is a herd of medium size and has made great strides toward high production. The herd is expected to complete the present year's cow testing association work with an average of more than 15,000 pounds of milk per cow for approximately 50 head of cows. The breeding frequency is represented in table X.

TABLE IX—*Services per calf in herd G.*

Cows	Total Calves	Services	
		Total	Average
24	24	25	1.04
34	68	76	1.01
16	48	61	1.27
14	56	75	1.30
10	50	62	1.24
5	30	46	1.53
6	42	60	1.48
3	24	37	1.50
3	27	39	1.40
3	30	42	1.40
3	33	47	1.50
3	36	51	1.24
124	468	621	1.36

TABLE X—*Breeding frequency in herd H.*

Cows	Total Calves	Months	
		Total	Average
6	12	129	10.75
8	24	255	10.62
12	48	546	11.39
4	20	242	12.10
1	6	68	11.33
31	110	1,240	11.28

TABLE XI—*Breeding frequency in herd I.*

Cows	Total Calves	Months	
		Total	Average
14	28	340	12.1
18	54	609	11.3
5	20	226	11.3
2	10	119	11.0
39	112	1,294	11.5

During the year 1930, 14 cows freshened the first quarter of the year, 16 the second, eight the third, and seven the last quarter, making a total of 45.

Herds I and J were included in the original group of 14 herds but were not reported previously.

HERD I

Herd I is of medium size and average production. It was issued a Bang disease-free certificate on December 11, 1929, and has qualified each succeeding year.

Thirteen cows freshened the first quarter of the year, 12 the second, 11 the third, and 10 the fourth. Table XII represents the services required of the bull.

TABLE XII—*Services per calf in herd I.*

COWS	TOTAL CALVES	SERVICES	
		TOTAL	AVERAGE
12	24	31	1.29
16	48	64	1.33
7	28	32	1.14
2	10	10	1.00
24	24	29	1.21
61	134	166	1.23

The additional services for conception were used accordingly: Twelve cows each required two services and two cows required five services.

TABLE XIII—*Breeding frequency in herd J.*

COWS	TOTAL CALVES	MONTHS	
		TOTAL	AVERAGE
16	32	372	11.6
17	51	591	11.6
16	64	716	11.2
14	70	802	11.4
3	18	210	11.7
1	7	83	11.9
67	242	2,774	11.5

HERD J

Herd J is one of the larger high-producing herds. The breeding frequency is represented accordingly (table XIII).

The herdsman in charge of herd J has attempted to have each cow bred on her first estrual period. This practice does not seem to affect the breeding frequency of the herd materially as compared with the other herds, possibly for the reason that he has failed to recognize the first estrual period following freshening. On its initial test, herd J had a high percentage of infection and the reactors were removed immediately following each test. It was issued a Bang disease-free certificate on August 31, 1929. Table XIV represents the services required of the bulls. Twenty-seven cows freshened the first quarter of the year, seven the second quarter, 15 the third and 13 the fourth.

TABLE XIV—*Services per calf in herd J.*

COWS	TOTAL CALVES	SERVICES	
		TOTAL	AVERAGE
6	6	7	1.2
15	30	50	1.6
16	48	67	1.4
16	64	96	1.5
14	70	85	1.2
3	18	22	1.2
1	7	12	1.8
71	243	339	1.4

SUMMARY

A summary of the 14 herds studies is represented in table XV. An analysis of table XV, which summarizes the 14 herds, indicates that 511 cows produced 1,655 calves in 19,498 months, with a calving frequency of 11.7 months.

Approximately 20 per cent of the animals to freshen each year are heifers. This is sufficient to supply the necessary replacements required by death, injury and culling, to maintain a standard of production. In the institution herds the number of animals available from which to make a selection has been above the usual average, due to the ability of the herds to reproduce themselves practically each two years. Approximately half the calves born each year are females. If only a 20 per cent replace-

ment is required annually, it becomes possible for those making a selection to choose only the best animals.

TABLE XV—*Summary of breeding frequency in fourteen herds.*

COWS	TOTAL CALVES	MONTHS	
		TOTAL	AVERAGE
31	110	1,240	11.28
50	119	1,430	12.00
15	34	371	10.90
16	33	364	11.03
18	37	371	10.30
9	21	283	13.04
61	230	2,671	11.60
39	112	1,294	11.50
29	66	738	11.18
67	242	2,774	11.46
54	180	2,156	11.90
23	73	914	12.50
100	447	5,412	12.10
15	30	337	11.20
527	1,734	20,355	11.70

Data available on the number of abortions which have occurred due to causes other than Bang disease are reported in table XVI. Abortion records available indicate that of 1,195 freshenings, 29 (2.4 per cent) were abortions.

TABLE XVI—*Yearly figures on abortions due to causes other than Bang disease.*

1928			1929			1930			1931		
COWS FRESH	ABORTIONS		COWS FRESH	ABORTIONS		COWS FRESH	ABORTIONS		COWS FRESH	ABORTIONS	
	No.	%		No.	%		No.	%		No.	%
115	4	3.4	256	4	1.5	373	12	3.2	451	9	1.9

The table includes the calving records of only those herds where the record of abortions was dependable. The smaller number of freshenings reported in 1928 is accounted for by reason of the fact that few herds were certified at that time.

The percentage of abortions in the individual herds due to causes other than Bang disease has varied from zero up to 5 per cent. The latter percentage was in a herd which experienced

three abortions with 60 freshenings. The following are some of the individual herd percentages: 1.03, 3.8, 2.7, 3.2, 2.2, 3.6. A few herds did not experience a single abortion during their last cow testing association year.

Conclusions

1. Bang disease-free herds breed with a regular degree of frequency which is known not to occur in most infected herds.
2. The elimination of Bang disease has brought about a high degree of satisfaction in the management of these herds.
3. It has furnished a definite program of disease control for those responsible.
4. It has insured a high state of breeding efficiency.
5. It encourages and justifies efforts at herd improvement.
6. It sets a higher standard of more economic production.
7. It has eliminated the uncertainty of production.
8. It also has furnished some insurance for a safe milk for the inhabitants of our institutions.
9. It has reduced the danger of persons becoming infected with undulant fever through personal contact or by drinking raw milk from Bang disease-infected herds.
10. The number of abortions experienced does not confirm statements frequently heard that a high abortion rate occurs in negative herds.
11. These herds are examples in their communities of the advantages in establishing Bang disease-free herds.

Acknowledgment

The writers express their appreciation to the institutions and to all others who helped in any way in making this report possible.

Reference

[1]Fritz, B. S., and Barnes, M. F.: Bang disease control work in fourteen state institution herds. Jour. A. V. M. A., lxxvi (1930), n. s. 29 (4), pp. 490-504.

Mother of Veterinarians Dies

A mother, whose life may be said to have been devoted to the veterinary profession, died at Kansas City, Kan., October 1, 1933. She was Mrs. G. B. Eagle, mother of Drs. R. F. Eagle, of Chicago, Ill., W. W. Eagle, of Kansas City, Kan., and T. J. Eagle, of Savannah, Mo., and the mother-in-law of Dr. R. B. Grimes, of Kansas City, Kan., at whose home she was living at the time of her death. Her three sons and her son-in-law all are graduates of the Kansas City Veterinary College.

DOUBLE DISLOCATION OF THE HIP IN THE DOG*

By GERRY B. SCHNELLE, *Boston, Mass.*
Angell Memorial Hospital

A black, mongrel dog was presented for treatment, 24 hours after an automobile accident. It had been examined by a veterinarian soon after the accident and a diagnosis of "spinal injury" given.

FIG. 1 (left). Posterior dislocation of coxo-femoral joint.
FIG. 2 (right). After reduction with Schroeder splint.

The dog could not stand. Both hind legs were carried forward in abduction, and rotated inwardly. Clinical examination and radiograph (fig. 1) showed dislocation of both hips. The "catch" in the diagnosis of this condition is that both legs are injured similarly and, therefore, carried in like abnormal position. This

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leads the veterinarian to suspect injury above the limbs, but careful examination should reveal otherwise.

Nembutal was administered and the dislocation reduced by traction, outward rotation, and pressure on the point of the hips. Traction apparatus was applied in the form of the Schroeder modification of the Thomas splint, as shown in figures 2 and 3. The splints are brought forward and attached to a harness to enforce inward rotation and anterior position of the femurs.

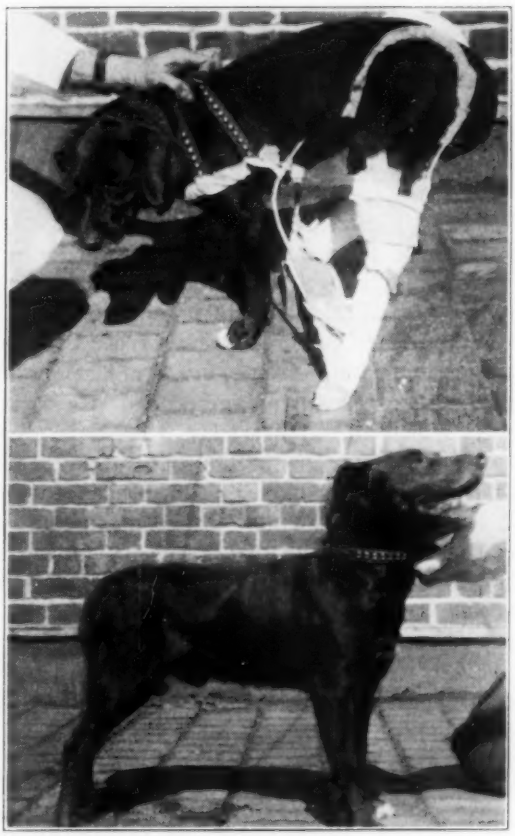

FIG. 3 (above). Schroeder modification of Thomas splint as applied in coxo-femoral dislocation.
FIG. 4 (below). Patient 14 days after the injury.

On the third day, one hip was displaced. This was reduced and the splint removed from the other leg. On the fourteenth day, the second splint was removed and the animal discharged ambulant (fig 4). Two weeks later, the owner wrote that the dog goes up and down stairs and jumps over chairs.

SPONTANEOUS BILATERAL RENAL CALCULI IN A DOG*

By C. F. SCHLOTTHAUER, *Rochester, Minn.*
Division of Experimental Medicine, The Mayo Clinic

Small renal calculi are not infrequent in the dog. Their occurrence has been observed by numerous authors. It is rare, however, that they attain a size of more than 1 cm in diameter. The case I am reporting is one in which a large stone was found in the pelvis of each kidney.

Kinsley[1] stated that, in dogs and cats, calculi are more frequent in the renal tubules than in the pelvis. Hutyra and Marek[2] expressed the opinion that urinary calculi occur most frequently in the wider portions of the urinary passages, the renal pelvis, and the bladder. They stated that the frequency of occurrence of these calculi is said to increase with age. Müller and Glass[3] mentioned that nephritic stones almost always occur in the renal pelvis. Their size may range from that of a mustard seed to that of a pea. They reported that Megnin found two stones in one dog that weighed 6 and 7 gm each. French[4] wrote that renal calculi are of only minor importance from a surgical standpoint, for they generally exist without producing symptoms. He mentioned that they frequently are found at necropsy. They usually are small and probably have their origin in the uriniferous tubules. They may, however, become very large in the presence of septic processes which cause an acid urine. Large phosphate calculi then develop. He reported that the two largest calculi recorded were observed by Guillon. Each occupied a kidney and weighed respectively, 96 and 97 gm. He did not mention the species of animal in which they were found.

The subject of this report was a female, mongrel-airedale terrier, aged six years, weighing 16.6 kg. She had been under my care and observation since October, 1929. Nothing of etiologic significance had been found. She manifested symptoms referable to renal stone only during the last week of her life, when some pus and blood were observed in the urine. She died rather suddenly, April 28, 1933.

Postmortem examination revealed the carcass to be in fair flesh. Rather extensive pyorrhea, with tartar encrustation of all teeth, was noted. The thorax revealed no gross pathologic condition; the abdomen was negative, with the exception of the kidneys

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and right ureter. It was noted that the right kidney was larger than the left, and that the ureter was dilated. Both kidneys and ureters were removed, measured and incised.

FIG. 1. A large, soft, white stone in the pelvis of each kidney.

A large, rather soft, white stone was found in the pelvis of each kidney (fig. 1). The right kidney was 9 by 5 by 4 cm in various dimensions and contained a stone 4.4 by 4 by 3 cm, weighing 45 gm. The left kidney was 6.5 by 4 by 3 cm in various dimensions and contained a stone 5 by 3 by 2.5 cm in diameter, weighing 35 gm. The renal pelvis and ureter on the right was filled with cloudy, viscid fluid, containing traces of blood and pus. The left kidney was apparently not functioning. Histologic study con-

firmed this. The right renal cortex revealed a very few, apparently normal glomeruli, most of which had undergone marked pathologic changes. The cortex of the left kidney was markedly atrophied, and all of its glomeruli were badly injured. The tubules of both kidneys were dilated, most markedly on the right side.

This dog must have suffered from renal dysfunction for some time. It is interesting that she failed to manifest symptoms of urinary disease until it had reached its terminal stage. Death probably was due to renal dysfunction.

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[3]Müller, G., and Glass, A.: Diseases of the Dog and Their Treatment. (5th ed., Alexander Eger, Chicago, 1926), p. 286.
[4]French, C.: Surgical Diseases and Surgery of the Dog. (Alexander Eger, Chicago, 1923), pp. 218-219.

NECROBACILLOSIS OF THE LIVER IN A STEER*

By A. N. MCGREGOR, *Tacoma, Washington*
Bureau of Animal Industry, U. S. Department of Agriculture

Although necrobacillosis is a condition not infrequently found in the livers of slaughtered cattle, opportunities for observing affected animals while alive are relatively few. Consequently, the morbid anatomy which characterizes the disease is probably better known than are the symptoms by which its presence in the living animal may be recognized. It is, therefore, possible that a description of the symptoms noted in a case recently observed in the pens of a federally inspected establishment at Tacoma, Washington, may be of diagnostic value.

The subject, a Holstein steer, about three years old, and in a fair state of nutrition, was one of a carload lot of cattle transported by rail from a shipping point in North Dakota. No further history is available, and it is, of course, uncertain to just what extent the symptoms manifested were accentuated by the long railroad journey. At the time of arrival the animal displayed marked apathy, and aversion toward movement of any kind, assuming a peculiar standing posture, with head and neck extended, and feet rigidly braced. The gait exhibited was awkward, the hind legs being abducted, and advanced slowly and stiffly, without flexion of the joints. The temperature was 105.8°

*Received for publication, October 19, 1933.

F.; respiration was entirely thoracic, shallow, and somewhat accelerated; visible mucous membranes were pale, but not icteric; eyes protruded slightly, and held a staring expression; rumination was suspended, and there was complete anorexia. Bowel movements were retarded, and the feces passed were scanty, dark in color, and dry. The animal was not observed in the act of urinating, and it appears probable that there was some voluntary suppression of this function, as the bladder was found, at the time of postmortem examination, to be distended with urine of a rather dark color. A profuse ptyalism was a prominent and persistent symptom. The secretion was clear, and was not viscid. An examination made of the tongue and oral mucosa disclosed no local lesions to account for this symptom.

The subject was held under observation for a period of three days. On the second day, the temperature declined to 103° F., and remained at about that point thereafter. Rumination was to some extent resumed, and the animal ate sparingly. With these exceptions the symptoms described persisted until the time of slaughter.

Postmortem examination revealed a liver greatly enlarged, light in color, and friable. Necrotic foci, somewhat smaller than those usually observed, were numerous throughout the liver tissue, but especially so in the cortex of the organ. There was subacute inflammation of the serous covering of the duodenum, and of the heart wall in the vicinity of the auricles. The mucosa of the gastrointestinal tract appeared normal. The diagnosis of necrobacillosis was based on the macroscopic lesions found, and was later confirmed by laboratory examination of affected tissues.

CENTRAL OHIO VETERINARY ASSOCIATION

Twenty-three veterinarians from Crawford, Delaware, Marion, Morrow and Wyandot counties, Ohio, met in Marion, October 19, 1933, and organized the Central Ohio Veterinary Association. Meetings will be held once a month in the various counties. It is expected that the establishment of uniform veterinary fees will be one of the aims of the newly formed association. Officers elected for the coming year are: President, Dr. A. C. Schafstall, New Washington; secretary-treasurer, Dr. O. C. Alspach, Marion. Dr. Alspach is also president of the Ohio State Veterinary Medical Association.

A dinner lubricates business.—LORD STOWELL.

ETAT DE LA QUESTION DE LA PRÉMUNITION ANTITUBERCULEUSE CHEZ LE BOVIDÉS PAR LE BGG EN FRANCE (Status of the Question of Antituberculous Premunition of Cattle in France). C. Guerin. Rec. de Med. Vet., cix (1933), 1, pp. 5-10.

The author again calls attention to the rule of restricting the use of BCG to newborn calves exclusively. At no time has BCG been advocated for the premunition of older animals even in those that do not yet react to the tuberculin test. While tuberculin is capable of detecting the minutest tuberculous lesion, it is incapable of detecting the disease before lesions have developed. This condition exists among many animals born in an infected environment and is responsible for the fallibility of the Bang method of control.

In regard to BCG and tuberculous infection, the body is dominated by the first one of these to occupy it. When the body is infected with the tubercle bacillus, not yet detectable with tuberculin, BCG can serve no useful purpose. Although employed in non-reacting human infants already exposed, the situation differs from that of animals in that the initial stage (lesionless) of the latter is much longer than in the human subject. This is evident from the small number of young bovines that react to the tuberculin test compared with the numerous infants who show cuti-reactions or intradermal reactions long before there are any apparent lesions.

The author, therefore, repeats that BCG vaccination in bovine animals lends itself exclusively to newborn calves less than 15 days old, that have been isolated from the time of birth and nourished on bacilli-free milk for at least a month after having been vaccinated. The article contains reports from 203 veterinarians, in France, who have employed BCG on a total of 9,244 calves. The reports indicate that considerable difficulty is encountered in having the necessary instructions carried out to the letter by owners. The isolation and the feeding of non-infective milk was not always properly carried out.

L. A. M.

HYSTERIA IN DOGS. Editorial in The Lancet, September 2, 1933, p. 551.

By this time many dog-owners have become unpleasantly familiar with canine hysteria or "fright disease." Its principal characteristic is that the animal, previously healthy, gets fits of apparent terror, followed by more or less depression. These symptom have been put down by some to encephalitis, but Mr. H. D. Walston's letter in *Nature* for August 12 (p. 243) suggests a different explanation. The evidence he has collected indicates, he says, that the disease is connected with vitamin-A deficiency, associated with ingestion of a substance present in dog biscuits and other cereals. Fifty-four dogs suffering from hysteria were studied, and it was found that all but one were receiving a diet in which cereals preponderated. Twenty-six of them were given the same diet and remained hysterical, whereas 28 were changed to a diet containing more vitamin A and thereupon recovered. It is recalled that E. Mellanby produced symptoms resembling canine hysteria by adding wheat germ to the diet of dogs which were getting too little vitamin A. It may also be recalled that, as long ago as 1928, the treatment which was found most successful was the removal of all biscuit from the dietary.* At the same time Mr. Walston's work does not, on the face of it, explain why the disease was not observed until about ten years ago, and why it has increased so rapidly in both America and England.

Michigan Veterinarians to Mexico

Dr. H. J. Stafseth, Professor of Bacteriology, Division of Veterinary Science, Michigan State College, left East Lansing, October 30, for Mexico City, Mexico. He has been granted a leave of absence, for three months, to assist the Mexican government in making a survey of the poultry-disease situation in Mexico and to advise the government, with respect to a program of poultry-disease research and control. Dr. Stafseth is well qualified for such an undertaking. He has had a wide experience in the investigation of poultry diseases and he has spent considerable time in foreign countries. His most recent absence from the United States was several years ago, when he spent a year in the civil veterinary service of the Norwegian government and a year in Hungary.

Dr. I. Forest Huddleson, also of Michigan State College, has been invited to visit Mexico and make similar investigations and recommendations relative to Bang's disease and other Brucella infections.

*The Lancet, i (1928), p. 249.

Regular Army

Major Solon B. Renshaw is relieved from further assignment to duty with the 1st Cavalry Division, Fort Bliss, Texas, will proceed to Fort Huachuca, Ariz., and report to the commanding officer for duty.

Major Sherman R. Ingram is relieved from duty at Fort Huachuca, Ariz., and assigned to Fort Ringgold, Texas, for duty.

Captain Lester W. Ingram having been examined for promotion by a board of officers and found physically disqualified for the duties of a major of the Veterinary Corps, by reason of disability incident to the service, his retirement by the President from active service as a major, under the provisions of the act of Congress approved April 23, 1908, and the act of Congress approved April 23, 1930, is announced to become effective September 30, 1933, with rank from September 8, 1933, the date upon which he would have been promoted to that grade by reason of length of commissioned service if found qualified.

The promotion of the following-named majors to lieutenant colonels is announced: Jacob E. Behney, with rank from September 3, 1933; Jesse D. Derrick and Raymond A. Kelser, with rank from September 7, 1933; Clell B. Perkins, Horace S. Eakins, Isaac O. Gladish, Jean R. Underwood, Clifford C. Whitney and Harold M. Egen, with rank from September 10, 1933.

Veterinary Reserve Corps

New Acceptances

Pilgrim, Stanley Lefeber..Capt...1731 N. 56th St., Milwaukee, Wis.
Reed, Irvin Theodore..2nd Lt.....Reed Hotel, Twin Falls, Idaho.

Promotions

To

Jasme, Henry Augustine..Major..311 Jefferson St., Savannah, Ga.
Ryan, Charles Lorin..Capt.....7 Pleasant St., Dexter, Maine.

Chem-O-Therapy

Another veterinary house organ has made its appearance in the field. Number 1 of volume 1 of Chem-O-Therapy, bearing date-line of October 15, 1933, has been mailed to members of the profession by its sponsor, Rare Chemicals, Inc., manufacturing chemists, of Nepera Park, N. Y. This new publication will be mailed on the 15th of each month to every recognized member of the veterinary profession, according to an announcement in the first issue.

Tribute to Doctor Barnes*

By W. H. ALLYN, *Byron, Ill.*
Manager, Rock River Farm

Mr. Toastmaster, my friend and former associate on the Pennsylvania State Live Stock Sanitary Board, and our honor guest, and gentlemen:

It is characteristic of the modern thoughtful spirit of the Extension Department of our College of Agriculture, that sponsors these valuable annual conferences, thus to honor you, Dr. Barnes, and itself, by holding this luncheon while you can be here and, we hope, enjoy it.

In a very peculiar way, you are responsible for the beginning of the work on Bang's disease control in Illinois that, since 1922, and due to the leadership of Dr. Graham, working with the effective coöperation of the Extension Service of the College of Agriculture and latterly of the State Department of Agriculture, has now resulted in 991 voluntary coöperating herd-owners placing 20,000 cattle under test in the project control of this disease in Illinois, from which 90 fully accredited free herds are now recognized by our State Department while 110 veterinarians have been accredited to make the preliminary tests.

My good friend, Dr. Graham, will not object, I am sure, if an incident that occurred in his office back in 1921 or 1922 is recalled. The blood test was under discussion as a means of controlling this disease. Dr. Graham was perhaps a little doubtful as to its real value in practice and proceeded to pull out records of a long series of tests made in his laboratory upon the same animals. He was much exercised over the fact that some animals would jump from positive to negative and then back again. Someone present remarked quietly that all this was disturbing, *but* the fact of the matter was that Dr. Barnes had been able to put all these uncertainties into a practical plan that produced

*Presented at the fourteenth annual Illinois Veterinary Conference, October 17, 1933. See report in this issue, page 707.

results for the herd-owners and it was such results that counted. I think Dr. Graham will agree that probably Bang's disease testing began to grow in use and service to the herd-owners of Illinois as the result of that slant on the problems so characteristic of Dr. Barnes' work.

You, Dr. Barnes, more than any other scientist who has worked with this disease, have made your laboratory work first of practical value to herd-owners. The history of your work emphasizes this practical application of your scientific work. While others, perhaps equally well equipped professionally, are still hoping and working for cures by vaccines or what not, *you* it was who first blazed a clear trail of useful accomplishment

DR. M. F. BARNES

by demonstrating that the disease could be stamped out of herds by the simple methods of accurate testing and retesting, isolation and elimination.

The live stock industry of Illinois, for whom I am privileged to speak today, owes a tremendous debt of gratitude to you and to our active and far-sighted Extension Department for the services you both have rendered to us.

But the Bang's disease-free herds of Illinois, Pennsylvania and America are first *your* monuments—and what monuments!

The cattle-breeders of Illinois salute you, Doctor, and wish you length of happy days!

WYOMING VETERINARY ASSOCIATION

The annual meeting of the Wyoming Veterinary Association was held at the Connor Hotel, Laramie, October 6, 1933, with a splendid attendance.

The veterinarians were welcomed to Laramie by Mr. L. A. Murphy, in behalf of the Mayor. The meeting was called to order by the President, Dr. G. D. Anderson. Following the President's address, an interesting talk on "Poisonous Plants of Wyoming and the Rocky Mountain Region" was given by Dr. O. A. Beath, of the University of Wyoming. Dr. Beath's talk was illustrated with lantern-slides which he himself had made. Dr. A. G. Fisk, of Greeley, gave an entertaining address on "Opportunities for the Practitioner."

The Association was pleased to have as its guests: Dr. R. M. Gow, state veterinarian of Colorado; Dr. J. O. Wilson, B. A. I. Inspector-in-Charge for Colorado; Dr. H. E. Kingman, of the Colorado Agricultural College; Dr. O. A. Beath, of the University of Wyoming, and Dr. Frank Breed, of the Norden Laboratories, Lincoln, Neb.

The afternoon session was called after much difficulty, due to a broadcast of the World's Series that was coming in over the hotel radio. When the veterinarians finally were corralled, they voted to hold the annual meeting earlier in the fall so as not to conflict with any World's Series dates.

The afternoon program was opened with a talk on "Morphology, Isolation and Immunity Studies of *Actinomyces Necrophorus*," by Dr. L. H. Scrivner, of the University of Wyoming. This was illustrated with lantern-slides shown by Dr. A. M. Lee, also of the University. Dr. Frank Breed gave a timely address on "Encephalomyelitis," followed by an excellent motion-picture film prepared by the University of California. Dr. J. H. Shoemaker, U. S. Bureau of Animal Industry, Laramie, concluded the addresses of the day with "Valuable Hints on Scabies Eradication and Demonstration of Dip Tests."

The voting resulted in the reëlection of all officers serving dur-

ing the past year: President, Dr. G. D. Anderson, Torrington; vice-president, Dr. R. Blackner, Lyman; secretary-treasurer, Dr. H. D. Port, Cheyenne.

C. E. WILMOT, *Resident Secretary.*

EASTERN IOWA VETERINARY ASSOCIATION

The twentieth annual meeting of the Eastern Iowa Veterinary Association was held at the Hotel Montrose, Cedar Rapids, October 10-11, 1933. About 125 veterinarians registered.

The meeting was called to order by the President, Dr. C. H. Banks, of Tipton, and the visiting veterinarians were welcomed to Cedar Rapids by Mr. Dan Kruidenier, Commissioner of Public Safety. Dr. C. C. Graham, of Wellsburg, made the response. The address of the President, the reading and adoption of the minutes of the 1932 meeting, the report of the Secretary-Treasurer, and the report of the Chairman of the Committee on Policy, Dr. L. W. Kellogg, of Anamosa, preceded a talk on the NRA by Mr. C. D. Manson, secretary of the local NRA Committee, and a paper, "New Live Stock Regulations for the State of Iowa," by Dr. H. E. Seidell, chief of the Animal Industry Division, Iowa Department of Agriculture, Des Moines.

The afternoon program was diversified. Three papers were given as follows: "Sheep Diseases," by Dr. George R. Fowler, Iowa State College: "Application of Electricity to Surgery," by Dr. W. C. Vollstedt, Dixon; "Horse Practice," by Dr. Thomas A. Sigler, of Greencastle, Ind. Following Dr. Sigler, Dr. D. M. Campbell, of Chicago, presented interesting data on nutritional diseases in army horses. A feature of the program was the question-box conducted by Dr. L. A. Merillat, of Chicago, on horses, and by Dr. George R. Fowler, on sheep.

The annual banquet and ball were held in the evening, with a splendid crowd in attendance. Dr. Frank Breed, of Lincoln, Neb., officiated as toastmaster at the banquet. Short addresses were made by Dr. R. R. Dykstra, Dr. T. A. Sigler and Dr. H. A. Seidell.

Only one paper was presented on the second-day morning program, that by Dr. A. T. Kinsley, of Kansas City, Mo., on "A Century of Hog Cholera."* Dr. Kinsley could not be present but his paper was read by Dr. J. D. Ray, of Kansas City, Mo. Dr. Ray also led a discussion on the use of serum and virus in the control of hog cholera. Dr. Ashe Lockhart, of Kansas City, Mo., conducted a question-box and Dr. H. Preston Hoskins, secretary of

*Presented at the seventieth annual meeting of the American Veterinary Medical Association, Chicago, Ill., August 14-18, 1933, and published in the JOURNAL, October, 1933, pp. 449-463.

the American Veterinary Medical Association, Chicago, Ill., spoke on the value of coöperation between veterinarians and physicians. He also spoke briefly concerning plans for the Twelfth International Veterinary Congress.

In the afternoon, Dr. C. C. Hunt, of Mount Pleasant, presented a number of case reports on the uses of calcium chlorid in diseases other than milk fever. Dr. N. A. Kippen, of Independence, gave a very interesting report on a case of surgical intervention for the relief of traumatic pericarditis. This was followed by an animated discussion on the value of operating in such cases. Opinion was practically unanimous that operations avail nothing in those cases where the condition has progressed to the point where the animal is exhibiting symptoms.

The program came to a close with the presentation of a paper, "The Past, Present and Future Outlook of Cattle Diseases and Therapeutics," by Dr. R. R. Dykstra, of Kansas State College.

The following officers were elected to serve during the coming year: President, Dr. W. C. Vollstedt, Dixon; vice-president, Dr. W. S. O'Brien, Ryan; secretary-treasurer, Dr. Iva Dunn, Atkins.

IVA DUNN, *Secretary.*

INTERSTATE VETERINARY MEDICAL ASSOCIATION

The largest and one of the best meetings in the history of the Interstate Veterinary Medical Association was held at the Martin Hotel in Sioux City, Iowa, October 12-13, 1933.

Dr. R. Schaap, of Pipestone, Minn., president of the Association, opened the business session with a brief address, in his usual jocular manner. The Secretary-Treasurer's report was presented and showed the organization's finances to be in satisfactory condition.

The afternoon session of the first day was devoted chiefly to consideration of bovine afflictions. Dr. F. B. Young, practitioner, of Waukee, Iowa, discussed cattle practice. His many practical suggestions for restraint and for the treatment of common ills of cattle were very well presented and much appreciated.

Dr. C. P. Fitch, the popular chief of the University of Minnesota Veterinary Department, and an authority on Bang's disease, then discussed certain phases of that disease, especially modes of transmission and control. Many practical questions were asked and discussed.

Dr. R. N. Larimer, a Sioux City physician, followed with a brief talk on undulant fever, emphasizing the danger to those in contact with afflicted animals. Both he and Dr. Fitch emphasized

the possibilities of infection in man or animals through an unbroken skin or mucous membrane. Dr. George J. Collins, practitioner, of West Point, Neb., presented his method of handling many common practice problems. His suggestions were brief but clear and worthy of trial.

Dr. C. P. Fitch, as president of the American Veterinary Medical Association, was the chief speaker at the banquet Thursday evening. One hundred fifty-six were served in the Martin Hotel ballroom. After the dinner, President Schaap introduced Mr. Mark Thornburg, former Secretary of Agriculture of Iowa, who presided as toastmaster in his usual efficient way. Dr. Fitch told of the many benefits of the national organization to the individual veterinarian. Mr. Oscar Heline, a farmer, of Marcus, Iowa, and a member of the National Corn and Hog Committee, explained the motives and plans of that body. Mr. Thornburg then introduced the many guests and celebrities at the banquet, following which the floor was cleared and many enjoyed an informal dance.

An unusual feature of the program was in the form of moving pictures, taken by the Veterinary Department of the University of Minnesota, and presented by Dr. Fitch. A film showing the effects of experimentally produced cyanide poisoning in cattle, sheep and hogs, and the beneficial effects of the intravenous administration of a sodium nitrite solution was shown Thursday afternoon. At the banquet, a picture showing moose in northern Minnesota, afflicted with a peculiar locomotor defect, was shown.

The session Friday morning was presided over by Vice-President D. C. Scott, of Tekamah, Neb. Dr. C. D. Lee, of Iowa State College, opened with a fine discussion of poultry diseases. He particularly emphasized the variety of coccidia which accounts for the variations found in coccidiosis in birds. Also the variations in symptoms and lesions found in fowl cholera, and that insidious affliction known as fowl leukosis or fowl paralysis.

Dr. G. P. Statter, of Sioux City, a veteran of the horse practice days, gave a valuable talk on equine practice, which was of great benefit to the younger practitioners in these times of revival of interest in the horse. Dr. D. M. Campbell, of Chicago, responded to Dr. Statter's request by discussing the part with which deficiency of calcium is credited in causing bony unsoundnesses and obscure lamenesses in horses.

At a short business session, the Association voted a resolution of sympathy to the widow of Dr. J. M. Lichty, former Sioux City practitioner, charter member and past president of the Association. Also, resolutions requesting the federal government to take

over the tuberculosis eradication program in South Dakota, by paying the full indemnity, and thus assisting the control of cattle production.

The following officers for the ensuing year then were elected: President, Dr. A. L. Howard, Sioux City; vice-president, Dr. C. H. Haggard, Luverne, Minn.; Dr. W. A. Aitken, of Merrill, Iowa, (re-elected) secretary-treasurer. The new officers met with a committee appointed to consider the advisability of holding a clinic separate from the annual fall meeting. They reported in favor of such a clinic, probably next June, in Sioux City.

At the final session, Friday afternoon, President Schaap presided. Swine diseases were ably discussed by two of the veterans of the Swine Belt: Dr. J. O. F. Price, of Algona, Iowa, B. A. I. veterinarian, and Dr. L. U. Shipley, practitioner, of Sheldon, Iowa. Dr. J. D. Ray, of Kansas City, responded to the request of Dr. Price by discussing anaplasmosis as the possible cause of a common anemic condition in hogs.

Last, but not least, on the program, was a discussion of the vexing problem of "Regulating Interstate Traffic in Live Stock." Dr. C. E. Cotton, of Saint Paul, whose success in controlling live stock diseases in Minnesota has set the pace for other states to shoot at, opened the discussion by giving the history of the problem, in his interesting, forceful way. He was followed by Dr. T. H. Ruth, of Pierre, S. Dak., and Dr. H. A. Seidell, of Des Moines, Iowa, state veterinarians of their respective states. A lively discussion continued until late afternoon.

The meeting was a decided success from every standpoint. Contrary to expectations, the attendance broke all records. One hundred sixty-two veterinarians registered, and the total present undoubtedly exceeded 175. Every session was well attended and every number on the program was well presented and received.

The Ladies' Auxiliary meeting was likewise a success. "A good time was had by all!"

W. A. AITKEN, *Secretary-Treasurer.*

ILLINOIS VETERINARY CONFERENCE

The fourteenth annual Illinois Veterinary Conference was held at the College of Medicine, University of Illinois, Chicago, October 16-17-18, 1933. All sessions of the conference were held in the splendidly appointed rooms of the Medical School building.

During the three days there were three morning sessions and three afternoon sessions, and a prominent Illinois veterinarian

had been selected to preside over each session. These included: Drs. N. S. Mayo, of Highland Park; E. E. Byerrum, of Warrensville; L. A. Merillat, D. M. Campbell and H. Preston Hoskins, of Chicago, and J. V. Lacroix, of Evanston. No evening programs were scheduled. In the absence of Dr. Byerrum, president of the Illinois State Veterinary Medical Association, Dr. C. L. Miller, of Oak Park, president of the Chicago Veterinary Medical Society, presided at the Monday afternoon session.

Dr. D. J. Davis, dean of the College of Medicine and head of the Department of Pathology and Bacteriology, welcomed the veterinarians at the opening session and honored the conference with his presence practically all of the time during the three days.

Monday morning was devoted to "Laboratory Diagnostic Service." Dr. Robert Graham, of the College of Agriculture, covered animal disease, and Dr. Lloyd Arnold, of the College of Medicine and State Board of Health, covered human disease. They were followed by Dr. C. H. Stange, of Iowa State College, who presented "Problems in the Field of Veterinary Education."

The session Monday afternoon consisted of a symposium and demonstration of various methods of anesthesia in human and lower animals, by members of the staff of the College of Medicine.

On each of the three afternoons, Dr. K. F. Meyer, of the University of California, delivered a Gehrmann Lecture. The subject of the first lecture was "Undulant Fever, Bang's Disease and Malta Fever."

The morning of the second day was given over to human surgical clinics conducted by members of the staff of the College of Medicine. This was followed by a short period for questions and discussion.

At noon a luncheon was served in honor of Dr. M. F. Barnes, Director of Laboratories, Pennsylvania Bureau of Animal Industry, Harrisburg. Prof. H. W. Mumford, of the College of Agriculture, presided, and tributes to the splendid work done in the study of the control of Bang's disease by Dr. Barnes in Pennsylvania were paid by a number of prominent Illinois agriculturists and veterinarians.

The Tuesday afternoon session was started with a symposium on "The Relation of Diseases in Animals to Public Health." Dr. W. A. Evans, health editor of the Chicago *Tribune*, covered "The Man." Dr. L. Enos Day, of the U. S. Bureau of Animal Industry, took care of "The Animal." Dr. John G. Hardenbergh, of the Walker-Gordon Laboratory Company, Plainsboro, N. J., dis-

cussed "The Milk." Dr. F. J. Jirka, director of the Illinois State Department of Public Health, spoke for "The Health Officer," and Dr. W. H. Welch, former Chief Veterinarian, Illinois State Department of Agriculture, represented "The Live Stock Sanitarian." Dr. Herman Bundesen, president of the Chicago Board of Health, was unable to be present but sent his deputy, Dr. H. C. Becker, who read a paper prepared by Dr. Bundesen, entitled, "What the Century of Progress Has Taught Us in Public Health." At 4 o'clock, Dr. Meyer delivered the second Gehrmann Lecture on "Equine Encephalomyelitis." This lecture was illustrated with several reels of motion pictures taken by Dr. Meyer during the recent outbreak of the disease in Western states.

At the opening session on the third day, Lt. Col. R. A. Kelser, V. C., U. S. A., presented a paper on "Mosquitoes as Vectors of Equine Encephalomyelitis." Dr. E. H. Barger, of the College of Agriculture, spoke on "The Immunizing Properties of Pigeon-Pox Vaccine Against Chicken-Pox." Dr. B. A. Beach, of the University of Wisconsin, reported on "Results of Paratuberculosis Control in Wisconsin." Dr. F. E. Senear, of the College of Medicine, told of "The Use of Chaulmoogra Oil in Leprosy."

At the closing session on Wednesday afternoon, Dr. Meyer spoke on "Heterogeneous Infection Chains." The rest of the session was devoted to demonstrations of specimens in comparative pathology and autopsy technic. Dean Davis showed some very interesting specimens of thyroid tumors in dogs. Dr. G. Kampmeier explained various theories to account for human anomalies. Dr. L. Enos Day showed some mounted specimens of brucellosis in swine. Dr. Isadore Pilot presented some very interesting material on bovine streptococcus mastitis. Dr. George Milles performed an autopsy on a human cadaver. The conference came to a close with the third Gehrmann Lecture by Dr. Meyer, on "Psittacosis." This was illustrated with a number of interesting charts showing various phases of the recent outbreak of the disease in this country. Dr. Meyer also showed several reels of moving pictures taken during the course of studies of the disease in California.

Although the attendance was not what it should have been, the approximately 100 veterinarians who were in attendance expressed themselves as being extremely well paid for the time spent at the conference. There was a distinctly educational atmosphere in evidence during the entire three days and there have been few occasions when such a wonderful opportunity has been presented for veterinarians to enjoy such a cultural and broadening program as the one arranged by Dean Davis, Dr.

Robert Graham and their loyal associates. The program for this conference, the fourteenth of the series, really established a new standard for veterinary meetings in Illinois.

SOUTH TEXAS VETERINARY MEDICAL ASSOCIATION

The South Texas Veterinary Medical Association was organized at Kingsville, Tex., October 18, 1933.

This Association was founded as a regional organization and to coöperate with the State Veterinary Medical Association of Texas for the purpose of promoting veterinary affairs in that section of the State. Meetings are to be held quarterly, at various cities in South Texas.

The first meeting, at Kingsville, was attended by a large number of veterinarians of South Texas and was held at the headquarters of the famous King Ranch. A number of subjects were discussed during the forenoon. At noon, the members were guests of Dr. J. K. Northway, veterinarian to the King Ranch, at a real chuck-wagon lunch, prepared by culinary artists of the range and served in range cowboy style. The menu consisted of frijoles, cabrieto, tortias, enchiladas, quipin sauce, camp son-of-a-gun, panes and java, which was thoroughly enjoyed by everyone present.

The afternoon was devoted to clinics. Dr. Northway demonstrated his method of spaying heifers on the range and visits were made to the famous breeding herds of the King Ranch. Dr. Northway explained the various breeding experiments carried on by the ranch and gave an exhibition of the famous Santa Gertudis Jerseys, also African, Indian and American beef cattle, some of the finest specimens to be found anywhere.

The following officers were elected for the ensuing year: President, Dr. Leon G. Cloud, Laredo; vice-president, Dr. J. T. Traylor, Harlingen; secretary, Dr. J. K. Northway, Kingsville.

L. G. C.

A life spent worthily should be measured by a nobler line—by deeds, not years.—RICHARD BRINSLEY SHERIDAN.

12th International Veterinary Congress
New York—August 13-18, 1934

NECROLOGY

ERNEST M. MARTIN

Dr. Ernest M. Martin, of Waynesville, N. C., committed suicide on September 4, 1933, by shooting himself. He had been in very poor health for the past several years and it had been necessary for him to spend some time at Oteen Hospital.

Born at Wadesboro, N. C., August 11, 1888, Dr. Martin attended the public schools at Wadesboro and at Polkton, N. C., and then entered the Bingham Military School. His veterinary education was secured at the Kansas City Veterinary College, from which he was graduated in 1916. Dr. Martin practiced at Albemarle and Black Mountain, N. C., before going to Waynesville. He was commissioned as second lieutenant in the Veterinary Corps in August, 1917, and entered service in June, 1918. He was stationed at Camp Greenleaf and later at Camp Custer. While at the latter Camp in October, 1918, he contracted pneumonia and pleurisy and never recovered from the complications which set in. He was discharged in February, 1919.

Dr. Martin joined the A. V. M. A. in 1918. He was a member of the North Carolina State Veterinary Medical Association. He was a member of Delta Chapter of Alpha Psi Fraternity. Dr. Martin was a very capable veterinarian, thoroughly honest and had a very pleasing personality. He had a large number of friends and was well liked by his colleagues in the profession. He is survived by his widow and five children.

W. M.

WALTER L. NILSON

Dr. Walter L. Nilson, of Minneapolis, Minn., died September 10, 1933. The immediate cause of death was peritonitis, which resulted from the rupture of a hepatic abscess.

Born in Minneapolis, June 1, 1903, Dr. Nilson received his early education in the local schools. In 1925 he matriculated in the College of Agriculture at the University of Minnesota, but re-

mained there for only one year. In 1926 he entered Iowa State College for the study of veterinary medicine and was graduated with honors in 1929. Following graduation, Dr. Nilson returned to the University of Minnesota as instructor in veterinary medicine at University Farm, Saint Paul. He held this position until shortly before his death.

Dr. Nilson joined the A. V. M. A. in 1929. He was a member of the Minnesota State Veterinary Medical Society and held membership in the Phi Kappa Phi and Gamma Sigma Delta fraternities. Dr. Nilson was a profound student and an ardent worker. He was particularly interested in veterinary physiology and physiological chemistry. He is survived by his parents and one brother.

H. C. H. K.

LESLIE HERMAN BENNETT

Dr. L. H. Bennett, of Monroe, La., met accidental death, October 1, 1933, through the discharge of a shotgun as he crawled under a fence near the dairy barn of the Louisiana Training Institute. He had been in charge of the veterinary department at the Institute for eight years.

According to report, Dr. Bennett heard a commotion caused by dogs chasing young cattle owned by the Institute. He proceeded to investigate and was not seen alive again. His body was discovered, some time later, near a wire fence, with his gun a short distance away but on the other side of the fence. A bullet fired through the heart had caused instant death. It is believed that Dr. Bennett crawled under the fence and then tried to pull his gun after him, when it was accidentally discharged with fatal consequences.

Born at Neponset, Ill., July 17, 1901, Dr. Bennett attended local schools and then studied veterinary medicine at Ohio State University. He was graduated in 1923.

Dr. Bennett joined the A. V. M. A. in 1932. He was a member of the Louisiana Veterinary Medical Association and the Alpha Chapter of Alpha Psi Fraternity. Dr. Bennett was active in social circles and took a prominent part in the activities of the local Young Men's Club. He is survived by his widow, two sons, two sisters and two brothers.

F. C.

ROBERT WALLACE PECHIN

Dr. Robert W. Pechin, of Phoenixville, Pa., died at his home, October 1, 1933, following an illness of three weeks, caused by bronchial pneumonia and heart trouble.

Born in Philadelphia, January 6, 1893, Dr. Pechin, with his parents, moved to Strafford, Pa., when he was only a few months old. He attended grade school in Strafford and then the Berwyn High School He then entered the University of Pennsylvania and was graduated in veterinary medicine in 1916. While at the University, he was a member of the track team. Following his graduation, Dr. Pechin entered practice at Phoenixville, Pa. For several years he held an appointment as meat inspector for Chester County, under the Pennsylvania Bureau of Animal Industry. He also was veterinarian to the Pennhurst State School.

Dr. Pechin was prominently known throughout Chester County for his interest in politics. He was a staunch Republican and, at the age of 28, he became a candidate for the Republican nomination for Burgess of Phoenixville. Much to the surprise of some of the older Republican leaders, Dr. Pechin was elected. He served one term of four years and then came out for re-election. He was an easy winner for the second term. He retired in 1930, after having served his town for eight years as chief executive. In 1923 he was the Republican candidate for Recorder of Deeds of Chester County and was elected from a field of four candidates. He served in this office from 1924 until 1928.

Dr. Pechin was a member of numerous local organizations of a civic and social character. He is survived by his widow, one son, one daughter and his father.

T. E. M.

FRANK PARKS TAYLOR

Dr. Frank P. Taylor, of Princeton, Ill., died at the Illinois Research Hospital in Chicago, October 6, 1933. After having been confined in a Princeton hospital for about six weeks, he was taken to Chicago for an operation for the removal of a kidney. The postmortem revealed that death followed the rupture of an aneurism of the abdominal aorta, about eleven inches from the heart.

Born near Elkhart, Ill., July 24, 1888, Dr. Taylor received his preliminary education in the Elkhart schools and then entered the McKillip Veterinary College. Following his graduation in 1911,

he engaged in practice at Atlanta, Ill. About eight years ago, he removed to Princeton to take the position of Bureau County veterinarian in connection with tuberculosis eradication. When Bureau County was declared a tuberculosis-free area, Dr. Taylor resumed private practice.

Dr. Taylor is survived by his widow (née Irene Mayer), one son, two sisters and three brothers.

CHARLES E. WINSLOW

Dr. Charles E. Winslow, of Rockland, Mass., died October 11, 1933, at the Worcester State Hospital, at the age of 78.

Born in Rockland, Dr. Winslow attended local schools and secured his veterinary education at the Montreal Veterinary College. Following his graduation in 1879, he returned to Rockland, where he built up a large practice. During the Boer War, Dr. Winslow was employed by the British government to take charge of shipments of horses from New Orleans to South Africa. He returned to Rockland and continued in practice there until a few years ago, when declining health forced him to retire. For many years, Dr. Winslow was Inspector of Food and also Inspector of Stables in Rockland.

Dr. Winslow joined the A. V. M. A. in 1880. This membership was terminated in 1890 and, in 1903, he was reinstated. He was a charter member of the Massachusetts Veterinary Association and served as president for the term 1927-28. His fraternal affiliations included the Odd Fellows, Knights of Pythias and the Masons. He was unmarried and left no immediate relatives.

H. W. J.

CHARLES F. PALMER

Dr. Charles F. Palmer, of Houston, Texas, died at his home, October 14, 1933, after an illness of about two weeks, caused by lethargic encephalitis or so-called sleeping sickness. His wife had died of the same disease three days earlier, and Dr. Palmer died without knowing that Mrs. Palmer had preceded him in death. It is believed that the couple contracted the disease during an automobile trip that took them to Saint Louis, about the time that encephalitis reached epidemic proportions in that territory.

Born in Wooster, Ohio, March 22, 1868, Dr. Palmer attended local schools and then entered the Ontario Veterinary College. He was graduated in 1891 and entered practice at Ripley, Ohio, where

he remained for eight years. He entered the service of the U. S. Bureau of Animal Industry, October 16, 1899, and was stationed at Boston, Indianapolis and New Orleans, before going to Houston, Texas. He was placed in charge of the Houston station in 1907, and served there continuously until his retirement, July 1, 1932.

Dr. Palmer joined the A. V. M. A. in 1918. He was a member of the National Association of B. A. I. Veterinarians. Dr. and Mrs. Palmer had no children and were survived by several brothers and sisters. Double funeral services were held for the couple in Houston, and the bodies were taken to Wooster, Ohio, for burial.

C. H. H.

SAMUEL R. CRAVER

Dr. Samuel R. Craver, of Youngstown, Ohio, died at his home, October 16, 1933, after a long illness.

Born at Lordstown, Ohio, January 8, 1868, Dr. Craver, with his family, later moved to Cortland. He attended the Cortland and Vienna schools. After his graduation from the Vienna High School, he taught school for several years. He had an early love for animals and saved enough money to enroll as a student in the Ontario Veterinary College. He was graduated in 1892 and returned to Youngstown, where he soon built up a very extensive practice.

Dr. Craver joined the A. V. M. A. in 1919. He was a member of the Ohio State Veterinary Medical Association and served as president for the term 1925-26. His fraternal affiliations included the Knights of Pythias, the Odd Fellows and the Maccabees. He was president of the Mahoning Valley Coon Hunters' Association, which he founded about twenty years ago and in which he had always been a guiding spirit. He was a director of the Second National Bank of Youngstown until its merger with the Mahoning National Bank.

It is reported that with Dr. A. M. Clark, Dr. Craver owned the first Boston terrier in Youngstown, the dog later winning the grand championship at the World's Fair at St. Louis, Mo., in 1904. During recent years, Dr. Craver had specialized in the breeding of hunting dogs. His interest in animals was entirely that of the sportsman and he was recognized as an expert judge.

Dr. Craver is survived by his wife (née Mary E. Camp), four brothers, one sister, one daughter and two sons, Dr. Nevin S. Craver (O. S. U. '21) and Dr. Thomas W. Craver (O. S. U. '29).

both of whom were associated with their father at the time of his death.

In the passing of Dr. Craver, Ohio has lost another outstanding representative of the veterinary profession. Death has laid an unusually heavy hand on the profession in the Buckeye State during the past year. Dr. Craver's death followed, within a twelvemonth, the passing of such men as Axby, Broerman, Eddy, Howard, Lambert, Myer, Pyper and Shepard. The Youngstown, Ohio, *Telegram*, of October 17, carried a beautiful tribute to the life of Dr. Craver, written by Esther Hamilton.

JOSEPH NEAL HUFF

Dr. J. Neal Huff, of Denver, Colo., died October 22, 1933. His death was due to complications following an operation for appendicitis. Although appearing to be in perfect health, Dr. Huff had suffered serious illnesses during the past three years. During this time, he had been examined many times by numerous specialists in Denver and eastern cities, but the exact cause of his trouble could not be located.

Born in Quitman, Mo., September 2, 1889, Dr. Huff attended grade and high schools in St. Joseph, Mo., before entering the Kansas City Veterinary College, from which institution he was graduated in 1910. For a few years, he was in the service of the U. S. Bureau of Animal Industry. A pioneer in the anti-hog cholera serum industry, Dr. Huff and associates, about twenty years ago, established a serum plant in Fort Worth, Texas. In 1923, he removed to Denver, with his family, and, shortly thereafter, he established the Colorado Serum Company, of which he was president at the time of his death.

Dr. Huff joined the A. V. M. A. in 1919. He was a member of Delta Chapter of Alpha Psi Fraternity and Park Hill Lodge 148, A. F. and A. M. Surviving are the widow (née Mabel L. Peterman), his mother, one son and four brothers, two of whom are veterinarians, Dr. T. B. Huff (K. C. V. C. '08), of Sioux City, Iowa, and Dr. L. B. Huff (K. C. V. C. '04), of Aurora, Ill.

L. E. D.

Our sympathy goes out to Dr. George W. Cober, of Chicago, Ill., in the death of his mother, Mrs. Elnora Cober, at Kenosha, Wis., on September 25, 1933. Mrs. Cober was in her 81st year.

We extend our sympathy also to Dr. William Hansen, of Green-

ville, Mich., in the death of his father, Mr. Niels G. Hansen, at Greenville, Mich., on October 13, 1933. Mr. Hansen was in his 90th year.

PERSONALS

MARRIAGE

Dr. Henry Rushton Recht (U. P. '32), to Miss Eugenie Isabelle Hoffman, September 7, 1933, at Great Notch, N. J.

BIRTH

To Dr. and Mrs. Howard F. Ferguson, of Newport, R. I., a daughter, Sheila Lois, August 5, 1933.

PERSONALS

Dr. C. B. Barber (Colo. '30) has located at Harrison, Ohio, for general practice.

Dr. B. A. Zupp (Iowa '23) has removed from Waltham, Minn., to Bloomington Prairie, Minn.

Dr. R. D. Turk (K. S. C. '33) has selected Coumbus, Kan., as an inviting field for general practice.

Dr. E. V. Bacon (K. C. V. C. '13), formerly of Estelline, S. Dak., is now located in Los Angeles, Calif.

Dr. James C. McCabe (Chi. '13), formerly located at Iowa City, Iowa, is now at Williamsburg, same state.

Dr. W. L. Davis (K. C. V. C. '10) reports a change of address from Monticello, Ark., to Shreveport, La.

Dr. Alfred W. Meyer (N. Y. U. '22) is with the Ellen Prince Speyer Hospital for Animals, New York, N. Y.

Dr. C. W. Anson (O. S. U. '26), formerly of Port William, Ohio, recently opened an office in Leesburg, Ohio.

Dr. Harold L. Smead (Corn. '32), formerly of Philadelphia, Pa., is now located at 53 Bliss St., Springfield, Mass.

Dr. E. J. Watters (Chi. '07), formerly of Houghton, Mich., has requested that the Journal be sent to him at West Allis, Wis.

Dr. A. R. Galbraith (Wash. '13), of Centralia, Wash., has been appointed a member of the Washington State Racing Commission.

Dr. J. LaVere Davidson (O. S. U. '33) has been appointed assistant food inspector, in the Department of Health, Kalamazoo, Mich.

Dr. B. J. Bjornson (O. S. U. '17) has removed from Mandan, N. Dak., to Fargo, same state, where he will engage in general practice.

Dr. Rex I. Mann (Gr. Rap. '12), of Coldwater, Mich., has been appointed Branch County Veterinarian by the Board of Supervisors.

Dr. L. Van Es (Ont. '93), of the University of Nebraska, recently received an appointment as member of the Health Council of Lincoln, Neb.

DR. A. H. KERR (K. C. V. C. '16), of Dudley, N. C., holds a commission as major in the North Carolina National Guard, attached to the 105th Medical Regiment.

DR. G. A. MEYER (Ind. '20), who has been located at Elk Mound, Wis, for the past 14 years, has moved to Waupaca, Wis., and has established a practice there.

DR. E. L. SHUFORD, JR. (K. C. V. C. '18), of Asheville, N. C., is a captain in the Veterinary Corps, Medical Detachment, 109th Cavalry, North Carolina National Guard.

DR. B. C. HUNT (McK. '19), formerly with the Illinois State Department of Agriculture, has returned to private practice and has opened an office at Crystal Lake, Ill.

DR. W. E. WELSH (Iowa '27), who has been in Artesia, N. M., for the past year, has returned to Hibbing, Minn., where he has entered into partnership with Dr. C. E. Swink (Iowa '27).

DR. I. B. HAVEN (K. C. V. C. '09), who has been in the employ of the Illinois State Department of Agriculture for several years, has returned to private practice at Greenfield, Ill.

DR. P. H. BLICKENSTAFF (Wash. '23), who is at present located in Ventura, Calif., received his Master of Science degree from Ohio State University in June. He majored in pathology.

DR. HUGH F. ARUNDEL (Cin. '19) has leased his hospital at Quitman, Ga., to Dr. Robert C. Fuller (A. P. I. '33), of Montgomery, Ala., and has returned to his former location at Statesboro, Ga.

DR. ROBERT LEARMONTH (Mich. '25), who has been at the University of Pennsylvania, Philadelphia, Pa., for the past year, is now located at the Walker-Gordon Laboratories, Plainsboro, N. J.

DR. HUGH E. CURRY (K. C. V. C. '08), of Kansas City, has been appointed State Veterinarian of Missouri, succeeding Dr. H. A. Wilson (K. C. V. C. '13), who held the office for about twelve years.

DR. A. M. MCCAPES (Colo. '27) has resigned his position as assistant professor of veterinary medicine at the University of Missouri and is now associated with Ashe Lockhart, Inc., of Kansas City, Mo.

DR. J. L. TYLER (Chi. '89) has been transferred again, this time from North Hollywood to Burbank, Calif. Dr. Tyler is with the Division of Animal Industry of the California Department of Agriculture.

DR. E. M. NIGHBERT (Ont. '94-K. C. V. C. '02) recently retired from his government duties, after more than 30 years of service in the U. S. Bureau of Animal Industry. Dr. Nighbert will make his home on his farm at Cantonment, Fla.

DR. GEORGE H. HESS (T. H. '18), of Woodstock, Ill., recently reported to the McHenry County Board of Supervisors that 88,213 cattle, in 3,021 herds, had been tested for tuberculosis during the year ending August 31, with only 488 reactors, spread among 235 herds, involving 8,384 cattle.

DR. GEORGE A. FERGUSON (U. S. C. V. S. '20), of Leaksville, N. C., has command of a brigade headquarters company of infantry in the North Carolina National Guard. He holds a commission as captain, has been in the infantry for six years, and has been in command of the company for the last three years.

DR. ROY F. LESLIE (O. S. U. '11) severed his connection with the Cleveland, Ohio, Department of Public Health and Welfare, on September 15, to accept a position with the Old Meadow Creamery of Cleveland. Dr. Leslie will carry on the inspection work for this Company and look after such other activities as properly come under quality control.